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Railway Age

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SIXTY-NINTH YEAR



A Single Archless Engine Injures Fuel Performance

EVEN one archless engine influences fuel records adversely.

An archless engine uses more fuel to haul a ton a mile. It's a handicap to the good job the railroads are doing of improving locomotive performance.

Since Security Sectional Arch pays for itself in less than two months, it is economy to have one in every engine that will ever leave the roundhouse to pull another train.

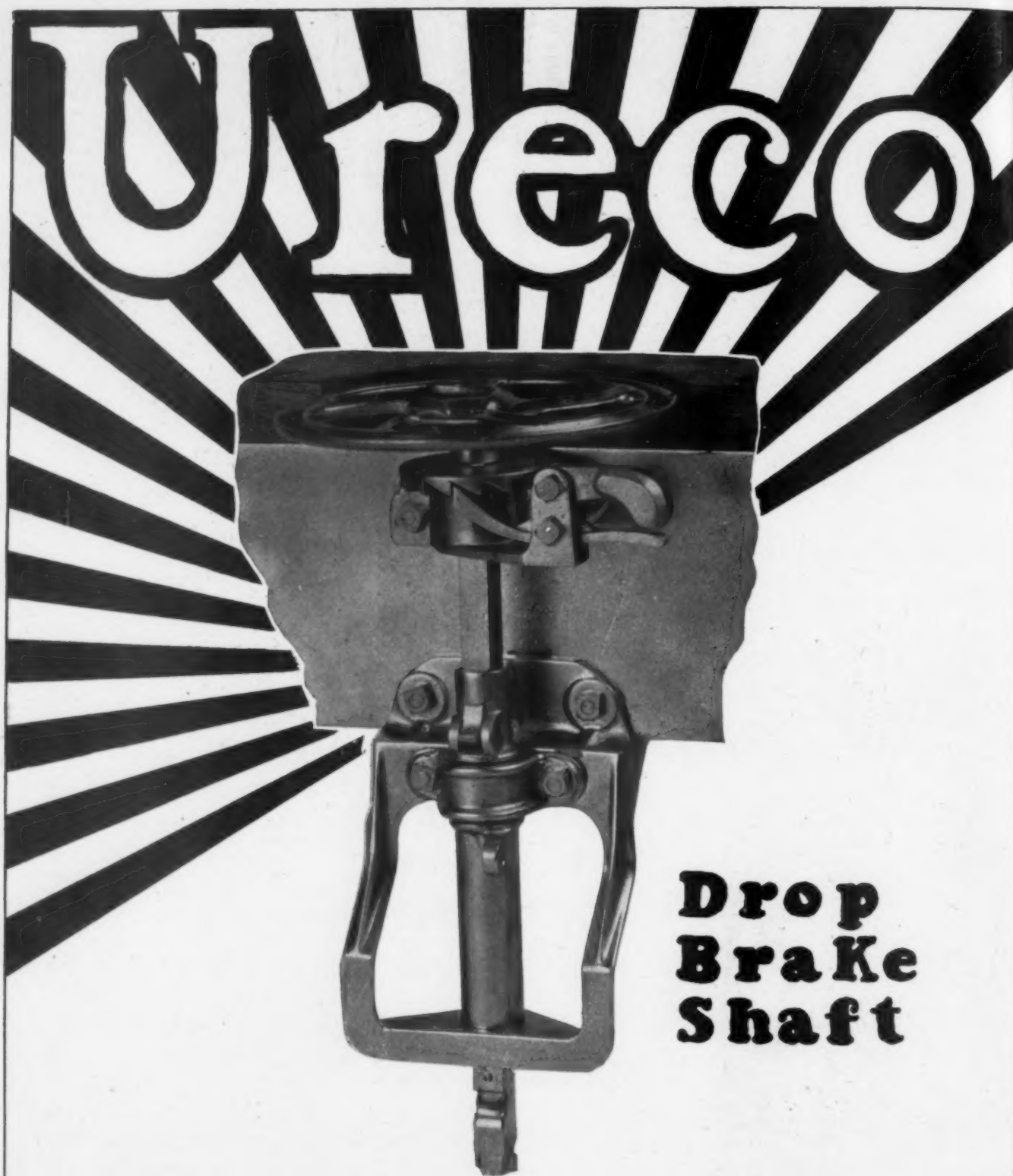
Join the 100% Arch roads.

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NEW YORK CHICAGO



*Security Sectional Arches help
keep full boiler pressure.*

Security Sectional Arch



**Drop
Brake
Shaft**

Union Railway Equipment Co.
McCormick Bldg. Chicago

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EDITORIAL

Railway Age

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Opening and closing the whistle sharply gives the sound 30 or 40 per cent greater penetrating power than when it is opened gradually and eased off slowly.

Slovenly
Operation of the
Whistle

A whistle that does not work perfectly but hisses ineffectually is a sign that the engineman is not a careful reporter of defects. Having a whistle cord on the fireman's side of the cab as well as on the engineman's side, would reduce by 25 per cent the automobile "accidents" at crossings. These are some of the points emphasized by a certain thoughtful trainmaster in a recent discussion of efficiency in train operation. They are repeated here, not because we are able to confirm with exactness the percentages of improvement which are specified; nor with a view to putting forward these three points as the main or the only things needing to be stressed in the education of enginemen and firemen in this part of their work; but as a reminder that careful attention to details in this matter has a real and practical value. Every enterprising trainmaster has a very definite duty in this connection. If he is lazily assuming that the enginemen cannot be improved he should question himself as to whether he can really be called an enterprising trainmaster. Numerous homilies on good whistling practice which have been printed in these columns have much potential value if trainmasters, in sufficient numbers, believe in them and put them into the heads of their runners; and practically *no value at all* unless that co-operation actually is forthcoming. The suggestions quoted call to mind another one, in the same line, namely, that a bell is heard much farther if it is on the front of the locomotive than if there is a stack or a dome in front of it. Another one is that, with highways nearly parallel with the railroad, the approaching automobile which needs to be warned may be half a mile away at the moment when the whistle is sounded. Education in this line embraces a good many points—if you aim to make all of your enginemen as competent and as trustworthy as are the few who are in Class A.

One phase of railway engineering which has not been the subject of general discussion during recent years but which,

Adequate Size
of
Waterways

nevertheless, continues to perplex the engineer of bridges, is the determination of the size of waterway openings for bridges, trestles and culverts. The bridge engineer is constantly required to weigh the relative considerations of economy in cost of construction and security against the maximum discharge of remote possibility. In studying this problem he has the benefit of discharge formulæ founded on scientific studies and established by records of rainfall and runoff covering a long period of years which he applies with a proper consideration of the particular characteristics of the drainage area involved. He also modifies the result thus obtained in the light of such records as may be available concerning previous maximum discharges or high water levels, such local records being frequently responsible for the reduction of the waterway opening from the size indicated by the application of the waterway formula. That the methods pursued are

not infallible is evidenced by the fact that washouts which may be definitely ascribed to inadequacy of the waterway opening are to be noted with every season of high water, the usual comment being that the rainfall exceeded all previous records or that the runoff was entirely beyond precedent. After a thorough consideration of his own experiences and those of others, one railway bridge engineer has concluded that much more weight should be given to the discharge formula than to previously recorded runoffs at the bridge site, for two reasons, (1) the accuracy of local records is not to be relied upon, (2) they may not extend over a sufficient number of years to cover a period in which, under the laws of probability, the maximum runoff may reasonably be expected to have occurred. This principle may well receive serious consideration. It should serve to place the designing of waterway structures on a sounder basis and while its adoption does not imply that structures must always conform to the requirements of the maximum probable flood, it would mean that the decision to provide for less than the ultimate contingency would be made with a full realization of its inadequacy.

With the increased complexity of railroad operation and maintenance direct telephone communication between officers

Automatic
Telephone
Exchanges

at the general offices, terminals and shops is becoming an economic necessity. Railroading is essentially a 24-hr. job, and the conduct of business in the general offices, division headquarters or roundhouses requires that men be at work or subject to call at all hours. Nevertheless, in many cases one will find that only an eight-hour service of a manually operated telephone exchange is justified at such locations. As a result communication facilities are either cut off or handled in a haphazard, disorganized way during two-thirds of the 24-hr. period. Telegraph service is of course maintained on the 24-hr. basis, but officers may have to exchange several telegrams before the necessary information can be secured and explicit directions given, so that the telegraph falls far short of rendering the service to be had with the telephone. Many roads are solving the 24-hr. local telephone service problem by the installation of automatic exchanges at shops, terminals and office buildings. The Louisville & Nashville has made great strides in providing automatic telephone service at its several terminals, division points, yards, etc. And to go one step farther and connect up these separate exchanges, facilities have been provided for through automatic switching from one local system to another. For example, a roundhouse foreman at Cincinnati can dial 81 and be connected directly through the Cincinnati exchange over a trunk line to a supervising operator at the Louisville general offices. For several years this road has been engaged in the construction of a complete system of long distance telephone lines for its own use, and in equipping these lines with automatic switching apparatus at terminal points. The ultimate purpose of this system is to connect up every important station on the railroad with every other and to handle all connections automatically rather than with operators. The L. & N. is

making marked progress in this construction program and the excellent results being obtained might well be investigated by other roads where communication facilities are found to be inadequate.

The Railways and Coal

THE RAILWAYS have a peculiar interest in the subject of coal. They have this peculiar interest because of the extent to which coal enters into their freight business, and also because of the extent to which it enters into their operating expenses.

On the average, coal constitutes about 35 per cent of the freight tonnage of the railways. When coal shipments are being made at a normal—or average—rate of about 10,000,000 tons a week, they tend strongly to make the total freight business of the railways normal. When coal shipments decrease or increase abnormally there are abnormal changes in car supply, in freight service and in both gross and net earnings. When the coal strike began in 1922 the density of the freight traffic being handled by the railways immediately declined 22 per cent. Between August, 1922, when the coal strike was still in effect, and October, 1922, after it was settled, the density of the freight business being handled by the railways increased almost 30 per cent. It was principally due to this great increase within a short time in the density of traffic, which resulted chiefly from an abnormal increase in shipments of coal, that the railways and the nation quickly found themselves confronted with the most acute congestion of traffic and the largest shortage of cars in history.

Late in March, 1924, there began an abnormal decline of shipments of coal. Freight business of other kinds also declined somewhat, but it is chiefly due to this large decline in shipments of coal that for almost four months total freight business, and also the gross and net earnings of the railways as a whole, have shown substantial decreases. The decline in the production of coal has occurred almost entirely at the union mines. The effects of the chaotic condition in the coal business can be traced throughout the entire railway system of the country. The earnings of the large coal carriers that serve chiefly non-union mines are being maintained. The earnings of many railways that are not large carriers of coal are being maintained and even increased. Both the gross and net earnings of railways that are large carriers of coal from union mines are suffering severely.

Excepting those engaged in the coal business, no concerns in the country would be affected so much as the railways by a change in the conditions which now cause such frequent demoralization in the coal industry.

From the standpoint of operating expenses, coal is also of very great importance to the railways. How many people realize that the amount the railways spend for fuel is now, and has been for some time, more than twice as great as the dividends they pay to their stockholders? In 1913 the dividends declared by the Class I roads amounted to \$322,300,000, and their expenditures for fuel were \$241,600,000. In 1923, ten years later, the dividends declared by them had declined to about \$280,000,000 and their fuel bill had increased, as stated by President Aishton of the American Railway Association in a recent address, to \$617,800,000. The amount of their fuel bill is determined by three factors—the volume of traffic handled, the amount of fuel consumed to handle a given amount of traffic and the price of fuel, especially of coal. The price of coal is determined by conditions beyond the control of the railways. The fluctuations in its price, however, whether due to strikes or other causes, have a marked effect upon their expenses. In April, 1922, the month in which the great coal strike began, the average cost

of coal to the railways was \$3.46 a ton. In August of the same year it had increased to \$4.87, or 40 per cent. The price continued relatively high for some months, but it has been declining steadily for a long time, and finally in February, 1924, reached \$3.23, the lowest figure reported by the Interstate Commerce Commission since it began publishing these statistics in 1920.

While the price of coal is beyond the control of the railways, the amount of it consumed to render a given amount of service is largely under their control. It depends upon the condition of locomotives, upon fuel supervision and upon operating conditions generally. The shop employees' strike had a very bad effect upon the condition of locomotives, and in consequence, there was a large increase in the amount of coal consumed to render a given amount of service. In June, 1922, immediately preceding the commencement of the shop employees' strike, the number of pounds of coal consumed per 1,000 gross ton-miles was 141. In September, long before cold weather began, this had increased to 155, and in February, 1923, it was 194. As the effects of the shop employees' strike have been removed the consumption of coal has declined, and in July, 1923, it was 143 pounds per 1,000 gross ton-miles, the lowest figure reported except in June, 1922.

The effects produced by the simultaneous reduction of the price of coal and increase in the efficiency with which it is used are indicated by comparison of the statistics for February, 1923 and 1924. In February, 1923, the amount of coal consumed per 1,000 gross ton-miles was 194 pounds, and the average price was \$3.72 per ton. In February, 1924, the average consumption per 1,000 gross ton-miles was 170 pounds and the average price was \$3.23. In consequence, the average cost of the coal consumed per 1,000 gross ton-miles declined from \$4.28 in February, 1923, to \$3.28 in February, 1924, or 35 per cent. Now, a reduction of 35 per cent in the fuel bill of the railways in 1923 would amount to \$216,300,000, and would, therefore, be equal to three-fourths of the entire dividends paid by them to their stockholders.

The present condition of the bituminous coal industry of the United States is one of great demoralization. The wages of union miners are so much higher than those of non-union miners that the union mines cannot anywhere near meet the prices for coal on which the non-union mines can operate at a profit. In consequence, the non-union mines can and do operate almost continuously while when coal prices decline the union mines are largely forced to close down. When practically only the non-union mines are operating the coal traffic of the railways is abnormally small. When there is a public demand for coal at prices which will enable the union mines to operate the railways are called upon to handle an abnormally large coal traffic. When the railways can get coal at low prices and thereby save in their operating expenses their gross and net earnings are reduced by a decline in coal shipments.

When they have a large coal traffic to handle their operating expenses are largely increased by the accompanying increase in the price of coal.

The railways should and will continue their campaign to save money by reducing their consumption of coal. It is, however, from their point of view, even more necessary that the demoralized conditions in the coal industry should be remedied in order to stop, or at least to alleviate, the violent fluctuations in coal traffic and in the price of coal. One way in which those who are constantly advocating reductions of railway rates could help substantially to make them possible, would be by contributing something toward stabilizing railway traffic and reducing railway expenses by promoting an improvement of conditions in the coal industry; but whenever the statesmanship of the country tackles the coal problem it quickly betrays its helplessness to deal with any economic problem of real difficulty.

New Accounting Classification Will Suffer from Haste

II

IN FACT, if criticism is offered, the *Railway Age* would much prefer to defend the accounting officers rather than to join with those who offer the criticism. Railway men in other departments may not be in a position to realize the enormous amount of work that has been put upon the accounting departments within the past few years. Increased work has resulted notably from the requirements of preparing reports for the Internal Revenue Bureau of the United States Treasury for purposes of the income tax law. The establishment of the Railroad Labor Board has introduced entirely new requirements in the form of more elaborate wage statistics. There have been many special reports of all sorts and kinds. The work of preparing the figures for the purposes of the federal control period and guaranty period settlements has not only necessitated the compilation of elaborate data but it has also required much thought and time. One accounting officer remarked the other day that he had prepared so many briefs in connection with his road's guaranty period settlement that he had become as much a lawyer as an accounting officer. Under such conditions it must be conceded that the accounting officer's problems have been extremely complex and the call upon his time and ability exceedingly heavy. Who can blame him, therefore, for desiring to relieve himself of some of the severe requirements—and of the expense therefor—that have been placed upon his department? Those who criticize the increased expenses of the accounting department are manifestly unfair if they do not give due consideration to the recent developments in connection with the railway accounting activity.

There is, however, another side of this question. There is a reasonable doubt as to whether the conditions of the past two years have been such as to make it the proper time to offer for the consideration of the railway accounting officers of this country such an important problem as the revision of the classification of operating expenses. The problem of revision is presented at a time when the desire to cut accounting expense is being given exaggerated importance. Possibly the exaggeration is justified—we are inclined to believe that to a considerable extent it is. Nevertheless, the situation is such that the discussion of the problem of revising the classification takes place in a wrong atmosphere. Similarly, the problem of revision is presented at a time when the accounting officer has other problems of great difficulty. Surely there is a limit to the number of involved problems that can be given to any man to solve at one time. Would it not be fair to ask any responsible accounting officer whether he feels in his own mind that the conditions surrounding his own activity have been such as to permit him to give the proposed revision of the classification of operating expenses the amount of attention and thought that he believes he should properly have given it?

It is probable that in the past two or three years there has been a more adequate realization of the necessity of proper analysis of the costs of railway operation. Such analysis has at least been one of possibly several reasons for the rapidly improving situation as to railway costs. If that be the case, it follows, that the realization of the importance of more scientific analysis emphasizes the importance of an entirely adequate classification of operating expenses.

The accounting officer has been one of those called upon to do much of the analytical work. Possibly he could do more. He gathers the figures and, as an accounting man, he is an analyst by profession. At any rate, he is so situated that his advice as to the proper conduct of an analysis should be most valuable. Are his capabilities along these lines

always realized by his fellow officers? Does he, indeed, always realize that he has them himself?

From here on the argument divides. On the one side, the question might follow whether the accounting officer has been called upon to use the classification for purposes of analysis himself. On the other, it might be asked whether opportunity has been offered the operating, maintenance, mechanical or traffic departments to come forward to determine whether the proposed classification meets their needs. The new classification once adopted will set a standard for at least the next ten years. It may lay down the lines of railway accounting procedure in perpetuity. It is necessary, therefore, that it represent the best arrangement for purposes of analysis and management control that the railway accounting brains of this country is capable of formulating.

The Interstate Commerce Commission by the terms of section 15-a is required to give heed to efficiency and economy of railway operation. It has thus far made only the merest beginnings with reference to its new responsibility. Its plans and procedure are only in the making. One wonders if it can as yet have formulated any ideas as to what it is going to need in the form of current statement of operating expenses for its purposes along these lines. The provisions of section 15-a are too new to make one suppose that it has. If so, would it not be advisable to wait until further development give better knowledge of what regulation will need in a new classification?

There are embodied in the tentative revision many ideas of outstanding merit, but it is questionable if there is yet represented in the classification the best railway accounting thought of the country. We agree with those who plead that the problem of revision be held for further study by the hitherto overburdened accounting officer himself, by the responsible people in other departments who will have to use the figures for purposes of management control and by the Interstate Commerce Commission which should get a more adequate realization of its needs in connection with section 15-a. Study of the revision as it has thus far taken place has been on the wrong basis of emphasizing the necessity of reducing accounting expense. There has thus far been inadequate realization of the needs of the users of the figures and over emphasis, it is feared, on the needs of those who compile them.

Results of Government Operation in France

STATISTICS regarding the operating and financial results of the railways of France in 1923, which recently have become available, show that government operation is producing in that country the results that it usually produces in all countries. Senator Norris of Nebraska introduced a bill during the recent session of Congress providing that the government of the United States should acquire and operate certain railways in competition with the private railways that this country would still have. The situation that Senator Norris desires to create here already exists in France. There are seven large railways in France, six of which are owned and operated by private companies and one of which, the State Railway, is owned and operated by the French government.

In the year 1923 each of the six private systems made earnings exceeding expenses, and their net operating income aggregated 732,000,000 francs. On the other hand, the State Railway's operating expenses were 113 per cent of—or 13 per cent greater than—its total earnings, and its deficit, which the tax payers must pay, amounted to about 145,000,000 francs. The private railways continued to reduce their

operating expenses as they have been doing ever since the war, and, therefore, increased their net earnings. The State Railway hardly reduced its operating expenses at all, the ratio of its expenses to its earnings in 1922 having been 114 per cent and in 1923, as already stated, 113 per cent.

M. Georges Allix, in an article in the *Paris Revue Politique et Parlementaire* for May 10, draws the following contrast between the Orleans Railway, which is privately operated, and the State System: "In extent, in the resources of the regions they traverse, and in the nature of their traffic, the Orleans and the State System are very similar; moreover they are operated with the same competence by a personnel of equal capacity. But whereas the former (the Orleans) operates with a surplus of 113,000,000 francs, an increase of 83,000,000 over that of 1922, the latter operates at a loss which exceeded 152,000,000 francs in 1922 and which will only be reduced by 8 or 10 millions for 1923. Such a poor showing is only attributable to the inherent defects of all State enterprises. It continues to give strong reason to those who are calling for the reorganization of the system."

The great difficulty encountered in reforming the operation of a government railway system is illustrated by a historical review given by M. Allix of efforts that had been made to reform the French State System. The Chamber of Deputies on December 18, 1920, passed a resolution instructing the government to proceed with its reorganization. A special parliamentary commission was appointed to study the question and presented conclusions which were rejected by the Superior Council for Railroads. The Superior Council, on the contrary, adopted a plan proposed by another organization; but nothing has been done to carry it out, and in consequence the State System continues to be wastefully operated and to incur expenses greatly exceeding its earnings.

It is evident the subject of government ownership is going to be pushed forward for discussion by radical politicians and labor leaders in this country in future months. Perhaps Senator Norris's bill for partial government ownership may be revived and pressed for consideration. If this should be the case, the American people will not have to rely entirely upon their own experience with government operation during the war as a basis for forming a conclusion. Government operation of railways has been tried for years, and is still being tried, in many countries. In almost every country the results have been substantially similar to what they are in France. M. Allix offers the true explanation when he says: Such a poor showing is only attributable to the inherent defects of all State enterprises. The governments may put capable men in charge of the operation of their railways, but the results are bad because even the ablest and strongest men cannot permanently defeat the political influences that are always brought to bear upon government business.

Books and Special Articles of Interest to Railroaders

Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Coal Resources of the Raton Coal Field, Colfax County, New Mexico, by Willis T. Lee. Descriptions of the coal beds of various ages, mines in existence, railroad facilities, and possibilities for future development. U. S. Geological Survey Bulletin 752. 254 p. maps, diagrams. Pub. by Govt. Print. Off., Washington, D. C. 50 cents.

Economic Factors in International Relations, by William S. Culbertson. Especially American investments in foreign railroads, and foreign investments in American railroads. In Conference on Economic Aspects of International Affairs

under Joint Auspices of Chicago Council on Foreign Relations and Illinois League of Women Voters, April 11-12, 1924, p. 32-48.

European Economic Conditions Which Affect the Markets for Agricultural Products, by H. B. Smith. Economic conditions, effects of reduced purchasing power on consumption, govt. control and regulation of commerce, transportation and communications discussed. U. S. Dept. of Commerce. Trade information bulletin No. 235. 62 p. Pub. by Govt. Print. Office, Washington, D. C., gratis from Dept. of Commerce.

Informing Your Public, by Irving Squire-Kirtland A. Wilson. With a bibliography. 158 p. Published by Association Press, New York City.

My Trip Over the International Railways of Central America, by F. J. Lisman. Describes railway systems of Guatemala and Salvador. 12 p. Pub. by F. J. Lisman Co., New York City.

Railway Year Book, 1924. New edition of year-book containing statistical, historical and other information about British railways. 382 p. maps. Published by Railway Publication Co., London, Eng. 5 shillings.

Periodical Articles

"Miss Kate" Has Been a "Railroad Man" for Forty-One Years, by F. Q. Treadway. Miss Potwin, Southern Pacific agent at 16th Street Station, Oakland, Calif., *American Magazine*, June, 1924, p. 75-76.

Modern Efficiency and Freight Rates. Automatic signaling on the Western Maryland pointed out as example of saving through increased efficiency. *Outlook*, June 25, 1924, p. 800-801.

The Realities of Georgia. Activities of Central of Georgia's experimental farms, p. 4. *United States Investor*, June 21, 1924, p. 1-5.

Immortal George. Thus is the Pullman Porter Dubbed Knight After Him Of The Dragon and Mount Vernon, by M. B. Levick. An historical inquiry into what is in this name. *New York Times Magazine*, June 8, 1924, p. 10.

An Interview With Sir Henry Thornton, the American Knight Who Is Running Canada's National Railways, by D. M. LeBourdais. On what he is trying to do and how. *Outlook*, June 4, 1924, p. 193-195.

Rocky Climbs in Canadian Climes, by Betty Thornley. Descriptions of the bungalow camps operated "under the cold and critical eye of the champion hotel specialist, the Canadian Pacific Railway." *Vogue*, June 15, 1924, p. 65-67.

If Business Doesn't, Government Will, by Herbert Hoover. What business organizations have done and can do towards abating demand for government regulation. Co-operation between railroads, producers, labor and others in bituminous coal industry, mentioned. *Nation's Business*, June 5, 1924, special edition, p. 7-9.

Recent Decisions by the Supreme Court of the United States on Valuation and Rate-Making, by John Bauer. A Survey, with comments by R. L. Hale, D. R. Richberg, and William L. Ransom. *American Economic Review*, June, 1924, p. 254-282.

Some Economic Results of the British Railways Act of 1921, by C. E. R. Sherrington. *American Economic Review*, June, 1924, p. 227-239.

Southern Railway—Its Growth, Facilities and Future Outlook. *Barron's*, June 16, 1924, p. 6-7.

Value of Injunctions in Labor Disputes, by E. R. Witte. *Journal of Political Economy*, June, 1924, p. 335-356.

The Younger Generation. Principally of shippers. "The fate of the railroads, in a certain sense, is in the hand of this younger generation. Its friendship and good-will are worth while." p. 58. *Shipper & Carrier*, June, 1924, p. 57-58.

First Prize Paper in Co-operation Contest

Winner Emphasizes Budgeting as First Important Step in Co-operative Program

Henry Bruère, the winner of the first prize, is a director of the Chicago, Rock Island & Pacific, and is also third vice-president of the Metropolitan Life Insurance Company. He has a keen appreciation of the importance of the human factor in industry and has given considerable study to this question, both as concerns industry and the railroads. Undoubtedly his influence had considerable to do with the action of the Rock Island board of directors in establishing a department of personnel. He has been very active in keeping in touch with the leaders who have been interested in developing the science of management, and has lost no opportunity of emphasizing the importance of applying the successful principle of management to the railroad field.

Mr. Bruère was born at St. Charles, Mo., on January 15, 1882, and attended Cornell University for two years. He was awarded the degree of Ph. B. from the University of Chicago in 1901 and subsequently studied law at Harvard and New York universities and attended the School of Political Science of Columbia University. He became interested in social and human relations early in his career and was an organizer and director of various clubs and organizations for boys and industrial workers as early as 1901. In 1904 and 1905 he was engaged in investigating industrial relations problems for the International Harvester Company. In 1905 he investigated the public baths of New York City for the Association for Improving the Condition of the Poor. In 1906 and 1907 he was director of the New York Bureau of City Betterment and from 1907 to 1914 he was director of the Bureau of Municipal Research. From 1914 to 1916 he was chamberlain of New York City and has served on many city government boards and commissions.

Mr. Bruère's prize-winning contribution follows:

I

MANY of the special restrictions on the freedom of railway management may be capitalized to cultivate the co-operation of employees, and by this means to increase the efficiency of railway operation. By law, railroads are required to have "glass pockets." This fact alone removes the customary chief basis for anxiety and distrust on the part of employees in respect of corporation earnings and the use of the employing corporation's funds. The railroads are in purpose and in law dedicated to public service. Therefore, more urgently than general industry, they may invite the co-operation of their employees in the performance

of this public service, thus securing the interest and zeal such an appeal can be made to provide.

Regulation, often felt to be an obstacle to effective railway management, gives a basis for legitimately enlisting the employee as a spokesman of the industry in affecting public opinion through acquainting the public generally with current facts regarding railway management. Such a procedure has an educational effect on employees as well, and enlivens their devotion to the company they serve. The existence of powerful organizations among railway employees gives opportunity

to commit to these organizations certain definite responsibility for the success of the business.

In no other industry moreover, is there so firmly established the tradition of advancement for merit. The continuous recruiting of executive officers from the ranks by a steady process of promotion gives to the traditional "American opportunity" an enviable reality in railroad employment.

The conditions seem favorable and the time is ripe for the railroads to construct a genuine industrial democracy out of the materials which lie ready to their hands.

II

The basis of democracy is co-operation and the essential element of co-operation is common purpose and effective organization. An effective organization is one in which each individual does his part intelligently with appreciation of his relation to other members and with respect for good work in whatever position it is performed. Those who lead in any co-operative enterprise must have the capacity to lead and the good sense to acknowledge that the role of every man is not an equal role and that while the contributions of all are important, they are not of equal importance. Pride in work is essential, but so is humility and a sense of fair play.

III

The important first step in building a co-operating industrial organization is clear knowledge among its members of what work is to be done and of the essential facts regarding that work. For this reason I place *budgeting* first in the co-operative program.

Certain great semi-public corporations are using the budget principle of planning work and expenditures so as to permit every part of the organization to share responsibility in that planning and by so doing to give a clear picture of what performance is expected of every unit.

A railroad is composed of a series of operating units.



Henry Bruère

Each member of the railway organization has his place in one of those units. Each of those units requires a certain amount of money, materials, equipment and men to discharge its work. How much or how many of each of these essential elements may be needed depends on how much of each particular kind of work must be done.

Every useful man in an organization has, or is capable of, pride in his achievements. He wishes to measure these achievements by some standard and the most effective standard is the forecast of work required and an estimate of the cost of doing it. By such forecasts, useless activities and unnecessary expenditures may be eliminated and increased certainty secured that because work is done well according to plan, employment will be stable and compensation adequate.

Many railroads are now budgeting their capital requirements; somewhat fewer are budgeting their maintenance expenditures; several are applying the budget method to operations.

A budget may be for five years, a year, six months or a month, according to the feasibility of looking ahead in view of the fluctuating demands on railroads, both seasonal and because of business waves. But no matter to what period it may apply, a budget is a plan, plus a promise of performance.

Budgeting can be made a constant source of educating the organization in what its general purpose is and what are the specific parts of that purpose. It inspires confidence, intelligent understanding, fair rivalry with others or with achievements of last year or last month. In short, budgeting gives a *fact* basis instead of a *talk* basis for co-operation.

The much discussed and commended co-operative effort between management and the shop employees of the Baltimore & Ohio Railroad is a form of budgeting, to the extent that co-operation invites a common knowledge as between the management and the employees, of what is expected of the organization and a vision of steady work if those expectations are achieved.

The budget gives assurance that to the extent that careful human foresight based on knowledge of conditions permits, operations will be stabilized and hence a vigorous blow struck at the arch enemy of co-operation, irregularity and uncertainty of employment.

IV

Progressively to promote active co-operation, a railroad should have a personnel department. Some railway officials believe that any systematic attention to personnel relations beyond the arrangement of wage schedules is opposed to the independent temper of railway workers. They confuse personnel work with coddling, welfare activities. A true personnel department is merely a systematic method of forever keeping at the business of maintaining fair and proper working conditions on the railway, and for giving habitual expression to the natural interest that good executives must have in the well being and fair treatment of thousands of employees, often considerably without the range of their personal contacts. An officious personnel department is an abomination to the Lord, but an intelligent personnel department among others can do the following things to promote co-operation:

1. Lead in accident prevention work.
2. Maintain healthful and convenient working conditions, and take steps to promote co-operative attention to the health of all employees.
3. See to it that employee activities in recreation and education are made more widely useful to all employees.
4. Promote the selection of good men for employment; study and help correct conditions that lead to excessive turnover; locate good men already on the rolls for appointment to more responsible positions; stimulate the development of individual capacity and systematically develop lines of promotion in harmony with the splendid tradition in this respect now prevailing on the railroads in general.
5. Discover isolated good practices in promoting co-operation and make them known to all parts of the system.

6. Give employees information regarding company affairs through a company magazine and otherwise see that a company spirit is developed and the full reward reaped from the natural pride every true railroader feels in his railroad.

7. Help provide proper rest and change rooms for employees and see to it that they are maintained in fit condition. ("A green shade and a clean sheet in a division lay-over sleeping room," said one railway president recently, "is the best morale builder I know.")

8. Look after the housing of those employees necessarily employed at places remote from their homes.

9. Administer any co-operative undertaking in mutual employee-employer interest, such as relief activities, sickness assistance or life insurance.

10. Help promote employee and employer conference activities where they can contribute to better service and satisfactory working facilities and conditions.

A genuine personnel department will study the employees' side in all matters of management, seeking to obtain and with proper judgment to present in executive conference the "other side of the question." It will not interfere with management, but assist management by removing the occasion of grievances and antagonisms, and by tempering the habit to which all men in executive positions are prone, of failing to recognize that the human aspects of any enterprise are those which change with advancement in education, social habits and the fulfillment of natural human aspirations.

V

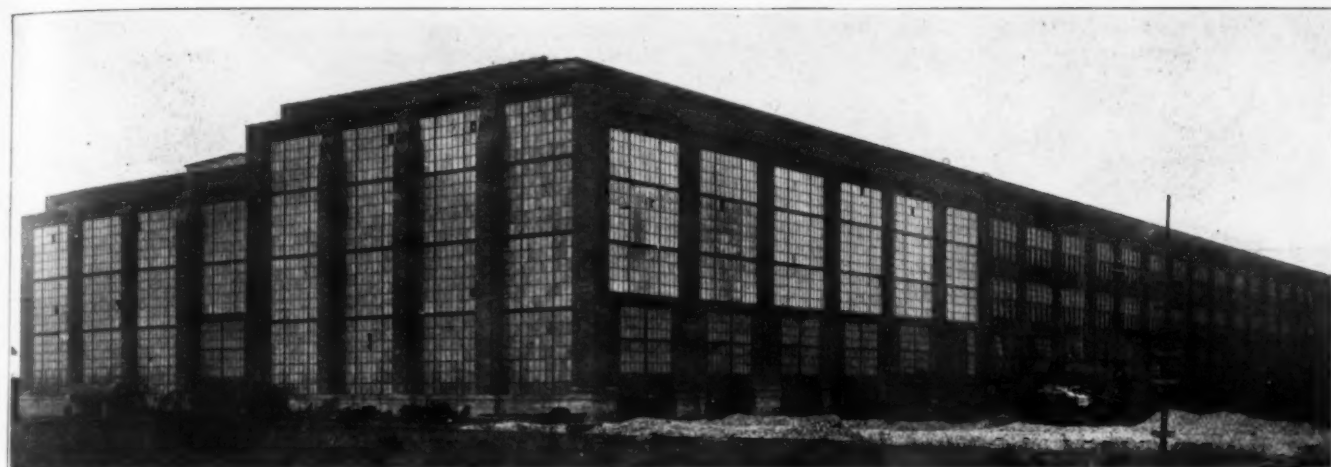
"Co-operation in railways depends," says another leading railway president, "on the provision of good working tools." Many railways have much to do to bring shop equipment and general facilities up to the best standards prevailing. This will require not merely funds, but chiefly better management, a management aware of the orderly, energy-saving methods of the better industrial establishments.

VI

As a final element of a program of co-operation, I add, identification of interest as between the railway as an employer and the employee in the welfare of the business. This may be facilitated by an extension, through well considered plans, of employee financial interest in the properties. It may result, in part, from the spread of such effort as the Southern Railway is making to give employees a share in prosperity, in proportion to their measured contribution to that prosperity. It may come from public identification of the least conspicuous railway employee in the esteem and praise that the railway may win by its service to any or all communities along its line. It may come from enlisting the aid of employees in building up the business of the road, as many railways are now doing, by making each employee a business-getter representative of the company. But it will chiefly come from giving the employee the *facts* about his company and its business, and sharing with him the pride of achievement not only that he may have the personal pleasure of such participation, but that he may become the enthusiastic spokesman for his company as a public servant among his friends and neighbors. You cannot have antagonism in your heart against an institution in whose fine achievements you have a personal pride. You cannot knowingly injure an institution when your neighbors honor you for your association with it, because you have told them of your pride in it.

IN SUMMARY

Nowhere in the world is there a body of workmen superior in mental ability or character to railway employees. They are uniquely American in character and tradition. If railway executives, knowing this, as they do, will consistently act on this knowledge by opening every channel for the proper exercise of these qualities for the good of the company, I prophesy a measure of industrial co-operation on the railways that will be the outstanding achievement in American industrial relations.

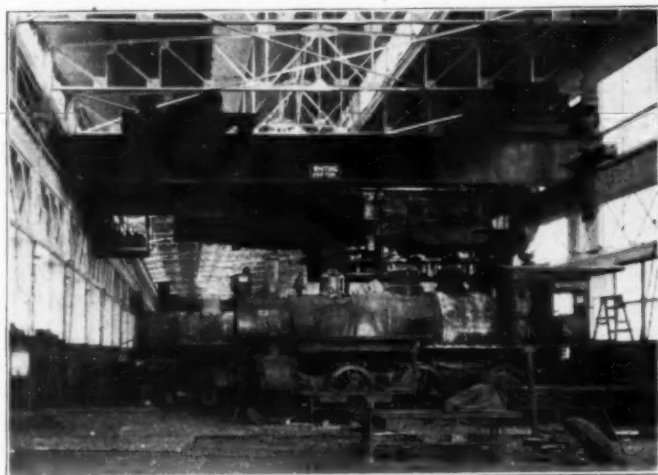


An Exterior View of the East Extension of the Erecting and Machine Shop

Kansas City Southern Enlarges Its Main Shops

Extensions at Pittsburg, Kan., Enable Boiler, Blacksmith and Erecting Shops to be Consolidated

SINCE the early part of 1922 the Kansas City Southern has been actively engaged in an extensive improvement program at its Pittsburg, Kan., terminal. This program includes several additions to the existing shop buildings and involves many other changes incident to the main project,



Interior of the East Extension of the Erecting Shop, Showing the 250-Ton Crane Handling a Locomotive

which is part of a comprehensive plan to provide facilities of large capacity in order to cope adequately with the increased demand for power and also with the increased size of the power, augmented by the rapid growth of traffic which in 1923 exceeded all previous records.

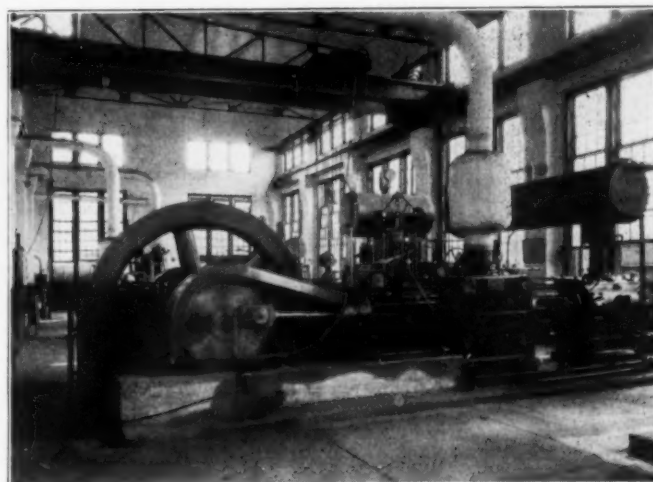
Boiler, Blacksmith and Machine

Shops Under One Roof

The Pittsburg terminal is located 129 miles south of Kansas City in the heart of the Kansas coal fields. It occupies approximately 100 acres adjacent to the city limits of Pittsburg. All of the equipment operating between Kansas City, Mo., and DeQueen, Ark., comes to this terminal for heavy repairs, which requires a force of approximately 1,000 men when the shops are operated to full capacity.

Under the former arrangement, the boiler and blacksmith shop were located in a separate building adjoining the erecting and machine shop, which involved unnecessary handling of parts from and to the erecting shop during the process of dismantling and assembling. Therefore, with a view to eliminating this lost motion, the new plan placed the machine, boiler and blacksmith shops under one roof, so that the various locomotive parts could be carried direct to their respective places by the overhead cranes which run the full length of the building in both the erecting bay and the machine bay.

In order to accommodate all three shops under one roof, six 22-ft. panels were added to the east end of the existing



The Interior of the Power House, Showing a New 500-Kw Engine-Generator Set

machine shop and five 24-ft. panels to the west end, making the completed building 150 ft. wide by 604 ft. long with 27 panels, 17 of which are used for a machine and erecting shop, 7 for a boiler and tank shop and 3 for a smith shop, each section running the full width of the building. The easterly extension is provided with pits 58 ft. long or 16 ft. longer than the pits in the old section to accommodate the

large 2-8-8-0 class Mallet locomotives which will be shopped in this section.

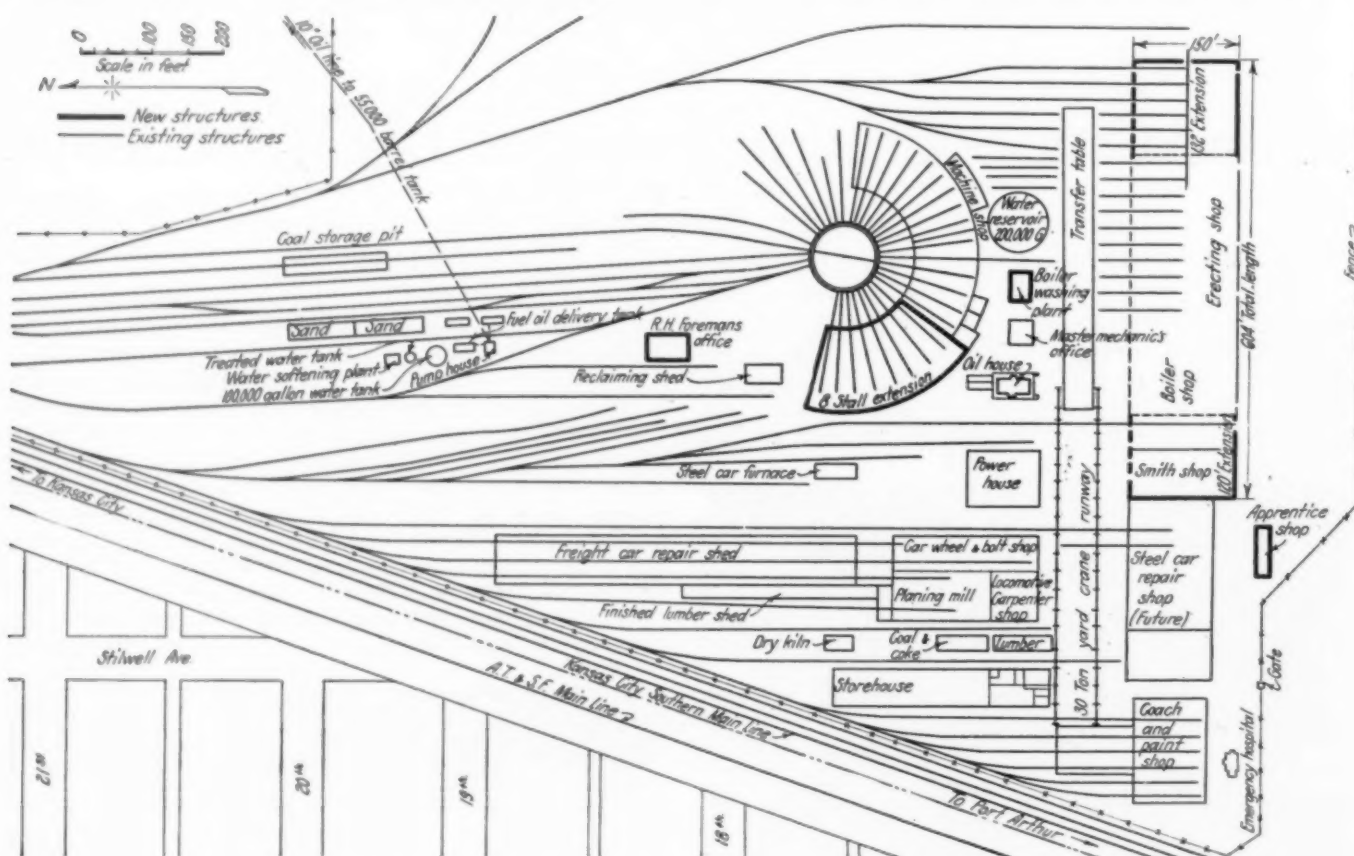
The entire building is of brick, concrete and steel construction, concrete being used for the outer walls from the footings up to the window sills. Above that point the walls are composed principally of Truscon steel sash with brick pilasters, which provides for a maximum of natural illumination.

The floor in the east extension is of three-inch creosoted wood blocks, laid on a six-inch concrete sub-base. In laying the wood blocks, narrow strips of corrugated paper were placed between each row of blocks to provide space for thoroughly sealing the joints between the blocks with bituminous filler after they were laid, thereby eliminating the possibility of surface water penetrating the blocks and causing the floor to heave. Plans are also under way to install

tool tempering section which is equipped with an electric furnace regulated by automatic control pyrometers.

The main machine bay is served by two high-speed cranes operating on the same runway, of 10 and 15-ton capacities respectively. The cages are so located that the operator is directly above the heavy machine tools, which enables rapid and accurate spotting of heavy locomotive parts such as driving wheels on the lathe centers. The light machine section under the balcony is served efficiently by jib cranes.

The erecting bay is also served by two cranes, one of 120 tons' capacity and the other 250 tons, the latter being of special twin-bridge double trolley gap design which enables it to raise a locomotive up between the bridges a sufficient height to pass over and clear locomotives on adjoining pits. This permitted the placing of the crane runways in the new extension on the same level as obtained in the original build-



A Map of the Terminal in Which the New Facilities Are Shown in Heavy Lines

this type of floor in place of the plank floor in the original building, down to the smith shop where a cinder floor is used.

On the south side of the building, extending the full length of the machine, boiler and tank shops, a balcony is provided 39 ft. wide, the floor of which is composed of reinforced concrete slabs capable of sustaining a uniform load of 200 lb. per sq. ft., covered with 1½ in. D. & M. plank flooring. This balcony accommodates the brass foundry, electrical and air brake departments, pattern, tin and jacket shops, lavatory and locker rooms. It also contains a section where all cab mountings are dismantled and repaired. In addition to this a manufacturing tool room is centrally located on the balcony, directly above the distributing tool room on the main floor and all small tools are transported from one tool room to the other by means of a dummy elevator, while heavy materials are handled from the main floor to the balcony by the traveling cranes over the machine bay. An interesting feature in the manufacturing tool room is the

ing, and gives continuous crane service by both cranes throughout the entire length of the completed shop.

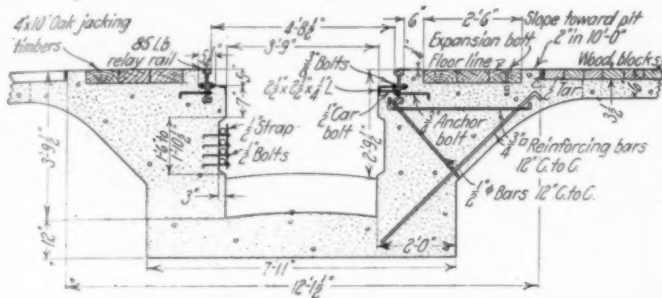
Unusual Illumination Measures Adopted

The method of interior lighting and light distribution was given considerable study and the scheme adopted includes high power incandescent lamps placed in Benjamin projectors, so spaced that approximately one watt per square foot of floor area obtains. In addition the entire interior of the building was given two coats of white enamel paint, and while this is a drastic departure from existing practices, the results are very gratifying as an unusual light distribution is obtained and the unusually cheerful and bright aspect of the shops is reflected in more and better work by the employees.

The building is heated by means of hot air, delivered from three fans, one located on the balcony and discharging through overhead ducts and two located on the ground floor under the balcony, discharging through ducts underneath the

floor and having ample capacity to heat the building properly during sub-zero weather.

Some doubt was entertained relative to the advisability of placing the smith shop under the same roof with the other facilities, on account of the smoke and gases that ordinarily prevail in such a shop, but owing to the generous head room and excellent system of ventilation provided, no bad



A Cross Section of the Roundhouse Pits

effects from this source have been experienced. This is due in large measure to the fact that suspension bulkheads were provided between the smith and boiler shops, extending from the roof down to the bottom of the lower roof truss chords. These bulkheads tend to confine the gases to the

- 1—36 in. drawcut shaper.
- 1—16 in. toolroom lathe.
- 1—100-ton rod bushing press.
- 1—2½ in. double head bolt threader.
- 1—electric furnace with tempering bath.
- 1—portable electric welder.
- 1—24 in. high speed planer.
- 1—Canton crane.
- 1—48 in. 400-ton wheel press.
- 1—McCabe ¾-in. flanging machine.
- 7—motors for individual drives.
- 1—30 in. by 16 in. sizer.
- 1—12 ft. 20-ton pneumatic clamp.
- 1—2 in. triple head bolt threader.
- 1—26 in. all geared drill press.
- 1—24 in. rip saw.
- 1—double head pipe and nipple threader.
- 1—pneumatic spring former.
- 1—turret head drill press.
- 1—18 in. tool room lathe.
- 1—drill grinder.
- 1—shaving baler.

Many of the existing machine tools which were purchased when the original shop was built are no longer capable of meeting the required production, consequently such tools as are still serviceable will be repaired and installed at outlying division points where lighter work is handled. The obsolete tools will be retired and modern tools will be installed in their place.

Plans are now under way to carry this program through and a machinery committee has been appointed to select the



The Interior of the East Extension of the Erecting Shop, Showing the Illumination and White Enamel Painting

smith shop where they are disposed of through gang-operated monitors.

Machine Tool Equipment Enlarged

The relocation and repainting of machine tools presented quite a problem when taking into consideration the necessity of moving practically 90 per cent of the existing machinery in order to fit in with the new grouping plan worked out to increase production and at the same time not retard the shop output. This, however, was accomplished successfully. In connection therewith the following additional modern tools were purchased and installed:

- 1—90 in. wheel lathe.
- 1—42 in. heavy duty engine lathe.

necessary tools required for this project, which will involve the purchase of the following tools:

- 1—3 in. flat turret lathe.
- 1—16 in. stud lathe.
- 1—6 ft. Universal radial drill.
- 1—vertical shear, capacity to shear 2 in. by 6 in. bar.
- 1—16 in. by 8 ft. portable bolt lathe.
- 1—54 in. vertical turret lathe.
- 1—30 in. by 10 ft. patternmaker's lathe.
- 1—vertical adjustable rotary type miller.
- 2—28 in. by 12 ft. engine lathes.
- 1—36 in. drill press.
- 1—18 in. by 6 ft. brass lathe with taper attachment.
- 1—24 in. by 8 ft. engine lathe.
- 1—30 in. shaper.
- 1—42 in. all geared drill press.

- 1—42 in. by 42 in. by 16 ft. 0 in. planer.
- 1—100-ton hydraulic driving box press.
- 1—3 in. forging machine.
- 3—24 in. by 4 in. double end grinders.
- 1—26 in. by 7 ft. 0 in. horizontal boring machine.
- 1—48 in. heavy duty car wheel borer.
- 1—54 in. heavy duty car wheel lathe.
- 1—24 in. heavy duty double end gap type axle lathe.
- 1—No. 3 Universal miller.
- 1—tempering furnace for high speed steel.
- 1—electric crane truck.
- 1—5,000 lb. single frame steam hammer.
- 1—internal grinder.
- 1—pyrometer equipment for spring and case hardening furnace.
- 1—pyrometer equipment for annealing furnace.
- 6—electric bench grinders.
- 1—oxygraph cutting machine.
- 1—electric driven hand carving machine for pattern shop.

Roundhouse Was Enlarged

As the capacity of the existing 16-stall roundhouse was inadequate, 8 additional 120-ft. stalls have been added. The existing roundhouse is also being remodeled and provided with a creosoted wood block floor and fitted with



The Interior of the West Extension of the Blacksmith Shop, Showing the Partial Partition in the Upper Foreground

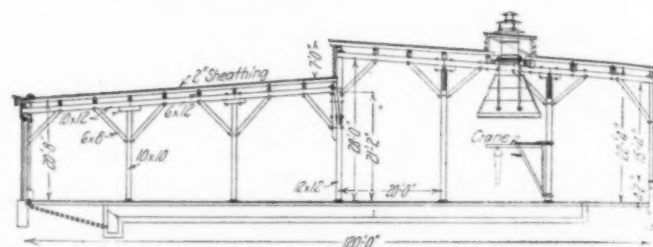
steam heating coils in the pits, replacing the hot air system of heating which was abandoned on account of being inadequate. The new extension is of concrete construction up to the window sills; above that point wood construction is used. The floor is laid with creosoted wood blocks on a six-inch concrete base. The pit side walls are of massive reinforced concrete construction permitting the use of jacks at any point desired without damage to the floor. Another feature worthy of mention is the depressed rail arrangement which permits the depression of wheels for removing and replacing driving springs and similar parts without the necessity of jacking up the locomotive.

In the new roundhouse extension the pit side walls were recessed to receive the steam heat coils so that they would not obstruct the free operation of the mechanics while working underneath locomotives. Post cranes are provided between every other pit on the outer circle for use in removing steam chest covers, cylinder heads and similar parts in making running repairs to locomotives.

The interior views of the roundhouse extension show clearly the arrangement of the flood lighting system used, which, in connection with the white painted interior, gives an excellent

light distribution. In addition, receptacles are provided at each post for extension cords when needed. These views also show the general arrangement and construction of the cast iron smoke jacks and the continuous monitors which, in combination with the roof design, afford an excellent system of ventilation and keep the interior of the house free from smoke, gas and condensation.

A modern lavatory and locker room with tile floor and sanitary plumbing is included in the project, also an auxiliary store room in which emergency repair parts will be carried. Adjoining the roundhouse on the south a 75,000-gal. five tank

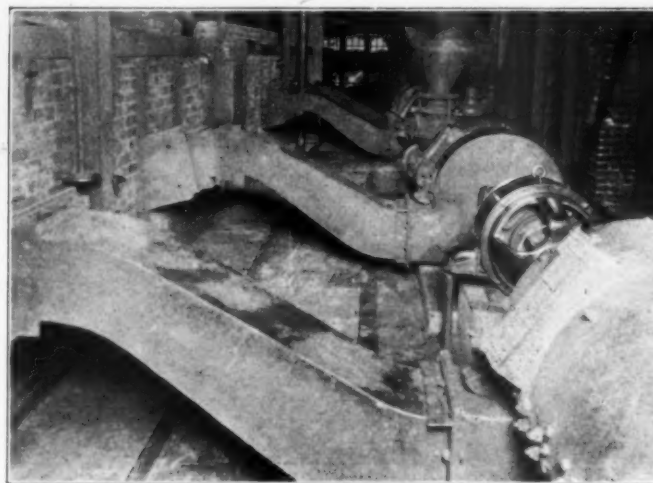


A Longitudinal Section of a Typical Stall in the Roundhouse Extension

hot water washout and refilling system, complete with pumps and piping, is being installed, having all of the latest improvements.

Other Facilities Were Added

North of the roundhouse adjoining the outgoing lead, a new two-story office building is being erected. This building provides office quarters for the roundhouse foreman and his staff; also the general road foreman of engines and the traveling engineers; also a spacious locker, washroom and lounging room for the enginemen. Communication between the roundhouse and the office is obtained by means of pneu-



The Pulverizer, Feeder and Burning Equipment for the Powdered Coal System

matic message tubes in addition to regular phone service, which permits the expeditious handling of work slips and other details of that nature.

This expansion required additional power plant capacity. To meet this demand a 500-kw. generator, also a 3,000-ft. air compressor and a 350-hp. water tube boiler were installed. This boiler is equipped for burning powdered fuel and is also fitted with a superheater designed to deliver steam with 150 deg. superheat, based on normal boiler rating and 1 per cent moisture in the steam received from the boiler. In addition to the new power plant units, the four existing 250-hp. water tube boilers are being elevated and equipped

with superheaters and also arranged for burning powdered fuel so that when the power plant project is completed, it will have a normal rating of 1,350 boiler hp., but with the type of powdered fuel equipment installed a 200-per cent rating can easily be sustained, giving 2,700 boiler hp. if required.

The success and economy of the powdered fuel installation can be judged best by the fact that the 350-hp. installation has been in continuous service for 18 months, burning a low grade slack coal which contains from 20 to 28 per cent ash and from 8 to 10 per cent moisture and during that time the cost of maintenance has been only \$0.0437 per ton of coal handled. The coal is dumped from hopper bottom cars on an elevated track into a hopper from which point it is carried by a conveyor to the crusher, after which it passes over a magnetic separator where any stray iron or steel that might damage the pulverizers is removed. It is then elevated to the overhead bins by an endless chain conveyor from which it runs by gravity to the pulverizers, one of which is located in

Among other items of interest is the installation of automatic time recording clocks throughout the various departments; also the establishment of a testing laboratory where all materials ordered to specifications are analyzed to see that their properties conform to the specifications.

In conjunction with this program an apprentice school has been inaugurated and a building 20 ft. by 55 ft. has been fitted up with the necessary drawing tables, models, filing cabinets and other equipment necessary to train the apprentices of the various crafts from a technical as well as a practical standpoint.

A modern fuel oil station with a capacity of 40,000 gal. was installed in place of the old station which proved inadequate and a 55,000 bbl. fuel oil storage tank has just been completed and connected to the new fuel oil station by means of underground pipe lines as shown on the plan.

Owing to the topography of the shop layout, the matter of proper drainage, especially during heavy rainfalls, has



The Interior of the Roundhouse, Showing the Illumination

front of each boiler on an elevated platform; the feed being set by the operator to correspond with the boiler load.

The five pulverizers are of the "Aero Unit" type, four of them being driven by direct connected motors and one by a single-stage steam turbine. They reduce the coal to a fineness that will permit 80 per cent to pass through a 200 mesh screen and have a sufficient capacity to sustain a 250-per cent boiler rating. These pulverizers have a blower attached direct to the rotor shaft which blows the powdered coal into the combustion chamber of the boiler as it is delivered from the pulverizer.

Each boiler is provided with a combination meter which registers the steam and air flow, flue gas temperature and boiler rating. In addition, steam, water and air meters are provided on all lines leading from the power plant so that a positive record of the power plant output is obtained at all times. These power plant improvements necessitated the relocation of the boiler feed and service pumps, also drastic changes in piping to suit the new arrangement, all of which was carried through without shutting down the plant.

The old boiler and smith shop which was vacated is being painted white on the inside and a hot air heating system is being installed preparatory to using this building exclusively for heavy repairs to steel freight equipment and tank cars.

given considerable trouble in the past, but this situation has been amply provided for by the installation of an elaborate storm sewer system composed of 36-in. vitrified clay tile, draining into a 7-ft. by 8-ft. reinforced concrete main sewer 1,100 ft. long which has an outlet into a creek adjoining the shop property.

The engineering work on the entire foregoing project was designed and carried out by the railway company's engineering staff, with the assistance of the mechanical department and the construction work was done entirely by company forces. John E. Muhlfeld was consulting engineer. It represents an expenditure of approximately \$750,000.

THE FLOWER BEDS scattered along the lines of the Reading Company number 225, and the number of plants set out this year has totaled 175,000. The chief gardener, Mr. Kotrba, keeps in his office an exact copy of the diagrams which are used in setting out the plants in all of the elaborate designs, having found it necessary, almost daily, to answer the letter of some passenger who has noticed from the car window the display in some bed, and who writes to learn the name of some particular flower. The Reading Company's greenhouses are at Wayne Junction, Pa., and Trenton Junction, N. J.

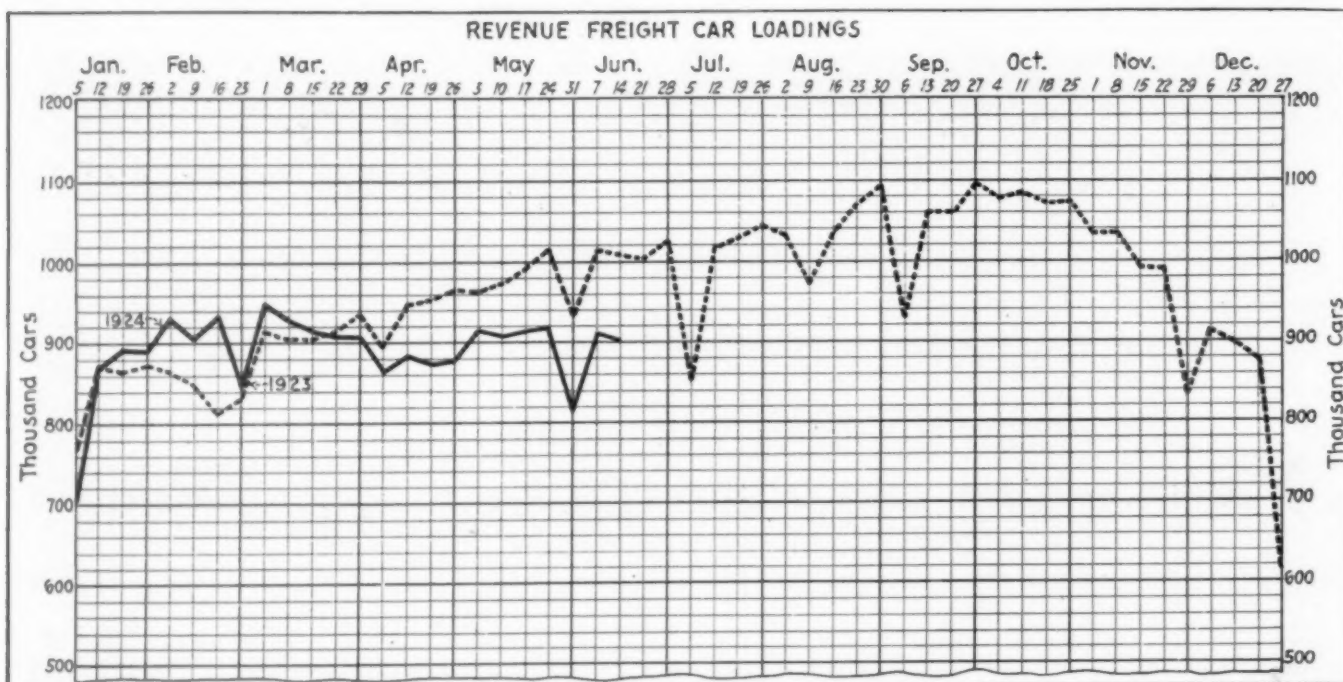
Freight Car Loading

WASHINGTON, D. C.

REVENUE FREIGHT CAR LOADING showed a further decline during the week ended June 14 to a total of 902,710 cars. This was a decrease as compared with the corresponding week of last year of 1,066,128 cars but an increase as compared with 1922 of 54,053 cars. There was an increase as compared with the corresponding week of last year in the Central Western and Southwestern districts and in grain and grain products and livestock but other classes of commodities showed decreases. L.c.l., merchandise and miscellaneous freight showed increases as compared with the preceding week. As compared with the corresponding week of last year the principal decreases were in the loading of coal, which was 48,703 cars less, ore, which was 19,240 cars

previous week, the decline being 871 cars. In the Eastern division decreases were recorded in grain, coal and ore and increases in merchandise and miscellaneous freight. In the Western division also grain loading was lighter by 1,056 cars and coal continued light due to labor troubles. Compared with the same week last year the improvement was 1,291 cars which was all in the Western division, the East showing a decline of 1,389 cars. Car loadings for three weeks by commodities follow:

Commodity	For week ended		
	May 31 Cars	June 7 Cars	June 14 Cars
Grain and grain products.....	11,747	10,607	9,161
Live stock	2,428	2,131	2,013
Coal	4,832	4,973	5,010
Coke	256	176	251
Lumber	3,839	3,964	3,994



less, and miscellaneous, which was 24,977 cars less. The summary as compiled by the Car Service Division of the American Railway Association follows:

REVENUE FREIGHT CAR LOADING—WEEK ENDED JUNE 14, 1924			
Districts	1924	1923	1922
Eastern	215,033	252,310	190,450
Allegheny	184,560	226,807	166,269
Poconchos	38,235	41,928	42,561
Southern	126,108	132,317	127,158
Northwestern	146,309	168,542	148,155
Central Western	135,169	132,909	118,894
Southwestern	57,296	54,025	55,170
Total Western districts.....	338,774	355,476	322,219
Commodities			
Grain and grain products.....	37,797	33,914	39,360
Livestock	29,649	27,901	29,184
Coal	138,252	186,955	91,177
Coke	7,555	15,185	9,193
Forest products	68,749	78,067	62,386
Ore	60,095	79,235	53,211
Mdse., l.c.l.	241,627	243,518	245,329
Miscellaneous	318,986	343,963	318,817
Total	902,710	1,008,838	848,657
June 7	910,707	1,012,312	836,208
May 31	819,904	932,684	739,559
May 24	918,213	1,015,532	806,877
May 17	913,407	992,319	780,953
Cumulative total, January 1 to date.....	21,374,652	21,979,249	18,291,101

Car Loading in Canada

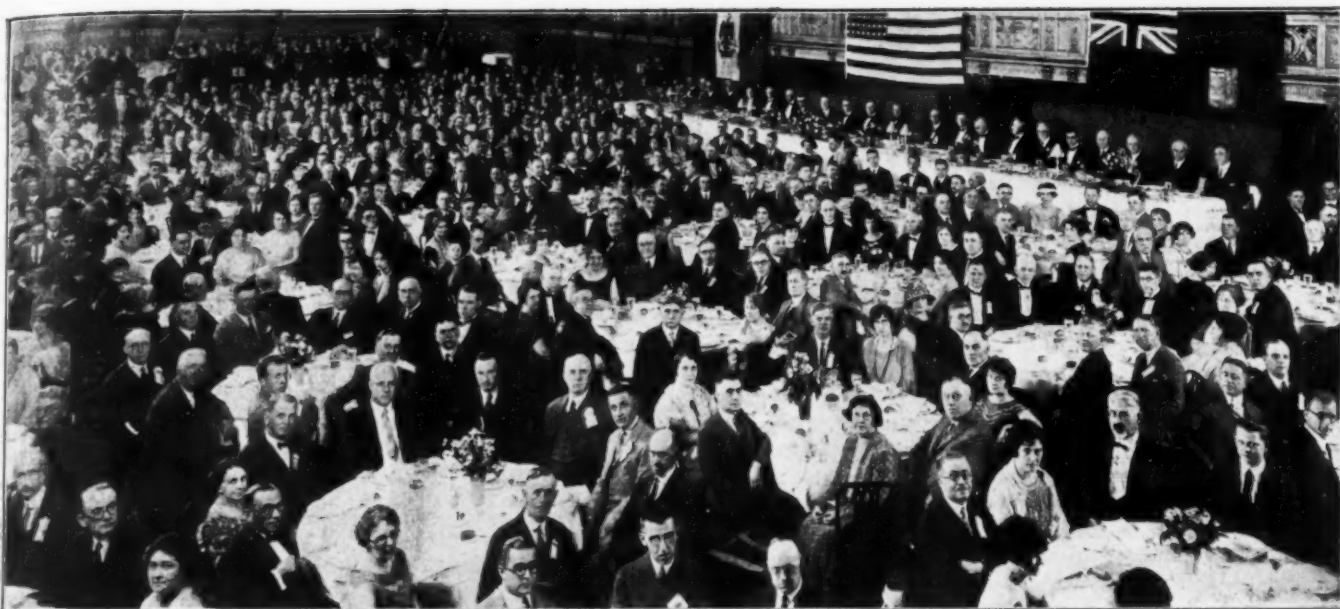
Revenue car loadings at stations in Canada during the week ended June 14 showed a slight decrease from the

Pulpwood	2,097	2,195	2,424
Pulp and paper.....	1,981	1,917	1,973
Other forest products.....	2,400	2,656	2,406
Ore	1,262	1,946	1,600
Merchandise, L. C. L.....	15,529	15,528	15,779
Miscellaneous	12,279	12,753	13,344
Total cars loaded.....	58,650	58,826	57,955
Total cars received from connections.....	29,787	28,256	29,426
Total cars loaded for corresponding week, 1923	54,484	53,527	56,664
Cumulative loading to date—1924.....			1,284,502
Cumulative loading to date—1923.....			1,177,219

The freight car surplus for the week June 8-14 averaged 362,961 cars, including 153,457 box cars and 169,133 coal cars.

The Canadian road surplus was 21,375 cars, including 18,725 box cars and 150 coal cars.

THE ATCHISON, TOPEKA & SANTA FE claims the latest "record." It is for priority in giving to the public the best and most novel features for the convenience and comfort of travelers: it was on the "California Limited" of that road that Honeymoon Cars were first run. A honeymoon car is a sleeping car with built-in head boards between the berths; an arrangement which, in the day time, is supposed to provide just the right degree of semi-privacy to suit those passengers who are making their honeymoon journey. One of the newest cars on the California Limited is called "Aphrodite."



The Annual Dinner Was Addressed by P. E. Crowley and Elisha Lee

Superintendents Hold Successful Convention

Public Relations, Grade Crossings, Long Engine Runs and Main Trackers Discussed at Buffalo

THE THIRTY-FIRST annual convention of the American Association of Railroad Superintendents, which was held at Buffalo, N. Y., on June 18-20, was the most successful in the history of that organization. More than two hundred general superintendents, division superintendents and trainmasters were present and participated actively in the discussion of such timely topics, as The Classification of Trains to Avoid Intermediate Switching, Long Engine Runs, The Elimination of the 31 Order, Grade Crossing Accidents, Public Relations Work and The Maintenance of Fast Freight Schedules. The sessions were presided over by W. S. Williams, general superintendent Illinois Central, Waterloo, Ia., president of the association.

An interesting incident of the meeting was the attendance of three officers of the National Railways of Mexico, R. M. Campos, assistant general freight agent, Mexico City; Manuel Chavero, superintendent of the northern division at Monterey, N. L., and president of the Mexican Association of Railroad Superintendents, and Lucia Lazcano, chief dispatcher at Monterey.

The outstanding feature of the program was the annual dinner on Wednesday evening which was attended by more than eight hundred persons and which was addressed by P. E. Crowley, president of the New York Central, and Elisha Lee, vice-president, Central Region, Pennsylvania.

The report of the secretary-treasurer showed the present membership to be 1,297, an increase of 129 during the year.

The following officers were elected to serve during the ensuing year:

President—E. H. Harman, superintendent, T. R. R. A. of St. L., East St. Louis, Ill.; first vice-president—G. O. Brophy, superintendent, U. P., Kansas City, Mo.; second vice-president—J. M. Walsh, superintendent, Y. & M. V., Memphis, Tenn.; secretary-treasurer—J. Rothschild, Union Station, St. Louis, Mo. Members Executive Committee—Chas. Burlingame, chairman, superintendent, T. R. R. A. of St. L., St.

Louis, Mo.; B. B. Tolson, superintendent, M. & O., Murphysboro, Ill.; T. J. Jones, general superintendent, Wabash, St. Louis, Mo.; W. S. Williams, general superintendent, I. C., Waterloo, Ia.; J. K. D. Brown, assistant superintendent, N. Y. C., Buffalo, N. Y.; W. F. Eckert, superintendent, Reading, Philadelphia, Pa.; Victor Parvin, superintendent, Ann Arbor, Owosso, Mich.

Richmond, Va., was selected as the location for the next convention.

Report of the President

In opening the convention, President Williams referred to some of the problems now confronting railway officers. He spoke in part as follows:

"The future growth and standing of this association will be measured only by the activity and efficiency of its members. It is therefore of vital importance that each member take a personal interest in the welfare of the association and assume his full share of responsibility for carrying on its work. The value of membership in this association is measured entirely by the activity of the member in association affairs. We can only provide the means through which the membership may be made valuable.

"Two or three years ago it was surprising how little the general public, including a large number of our substantial business men, knew about the problems confronting the railroads and, consequently, there was a corresponding lack of sympathy and co-operation. It is vastly different now as a majority of the public is taking advantage of the opportunity given them by the railroad executives to keep themselves fully informed on all matters pertaining to the railroads. Their confidence in the management of railroads has, to a large extent, been restored and they appreciate that anything detrimental to the interests of the railroads is a matter of public concern. I believe the time has come when division officers

are in a better position to carry this campaign forward than any one else. They are in constant touch with the people residing along their roads, and if they will make it a point to follow every complaint they receive to a conclusion and see that the incident is not closed until the party making the complaint has been fully informed as to the cause of the poor service, whether or not this involves an admission of guilt on the part of the railroads, it will go farther than anything I know of in maintaining and improving the friendly relations that must exist between the railroads and the public in order that the best interests of both may be served.

"Another question of immediate concern is the need for shipping freight, particularly coal and all classes of building material, during the early summer months. Last year at this time the railroads were carrying on active campaigns to induce consignees to lay in their supplies early in the summer when they could be assured an adequate supply of equipment to protect their shipments as well as prompt transportation service. The response to this appeal was gratifying and the earlier movement of these shipments made it possible for the railroads to handle a record business without the usual con-

gestion during the fall and winter which is always the result when buyers wait until the last minute to lay in their supplies.

"On our railroad division officers, accompanied by traffic representatives, have been making a station to station canvass, calling on all receivers of freight and urging them to profit by last year's experience and lay in these supplies at the earliest possible date. Secretary Hoover recently issued an appeal to the commercial organizations of the country, urging them to co-operate with the railroads in this movement. Our officers have been meeting with good success in the campaign they are carrying on, and I believe it is a matter that should be actively handled by all transportation officers during the next two or three months.

"I do not know of a better guide for our activities than the recommendations contained in the Constructive Transportation Program of the American Railway Association for last year, particularly those appearing in the Car Service Division's report under the captions Use of Equipment by Railroads, Elimination of Railroad Delays and Co-operation with the Public."

The Railroads and the Public

An outstanding feature of the convention was the emphasis placed on the superintendent's responsibility for the creation of a proper public attitude towards the railways by the dissemination of facts concerning them and their performance. This was presented by R. H. Aishton, president of the American Railway Association, at the opening session. It was again emphasized by Mr. Crowley and Mr. Lee at the annual dinner. It was the topic of Mr. Binkerd's address on Friday morning and was treated in a committee report at the same session. Abstracts of these addresses follow:

Address of R. H. Aishton

There are two major problems with which you are concerned, and on which your action and the results you secure will exert a decided influence on the attitude of the American public.

One of these problems is the question of adequate transportation. You answered this question so affirmatively in 1923 that practically no question has been raised as to lack of service, since that time. Neither is there much question today in the public mind but that the answer will be given affirmatively as to adequate service in the years to come, provided the railroads are given a chance to live.

The second great question before the American people is—"Are the railroads being operated efficiently and economically?" To show you the angle of thought that is engaging one very large section of the public, the farmers of this country, I quote a paragraph from an address made by J. R. Howard, former president of the American Farm Bureau Federation, which has been cited to me recently as representing the attitude of the American Farm Bureau Federation.

"We are asked to pay higher freight rates than those to which we have been accustomed. We are told that the increased railway income is necessary in order to attract capital for just such improvements. What the thoughtful farmer has in mind is a reduction in railway operating costs. Therein he sees the only hope for the ultimate rate reduction which he demands. He is thinking of the improvements most obvious to him, such as hydro-electric power; but he is coming to know, and I promise you he will increasingly know, something about the more intensive progress in every branch of transportation science. To you gentlemen the confidence and good will of the farmers is vital. You hope they will be patient about rates. You invite their co-operation for a

respite from railway legislation. Towards both those problems the attitude of agriculture will be profoundly affected if the farmers are convinced that the strengthened credit arising from the higher rates is to be used in devoting capital to improvements for economy."

What the farmer is thinking about, other sections of the American people are also thinking about, and many of them not as intelligently as the farmer. How are you going to answer this question, because it has to be answered? As I see it, it is going to be largely through the initiative, the disposition and the resourcefulness of such organizations as the one meeting here today, working co-operatively with the other branches of the service on those things having to do with more efficient and economical operation.

When you hear people talking about lack of efficiency on the part of the railway companies, what are the real facts? Has any business or any industry in this country shown the same progress in efficiency as the railroads during the passing years? The only trouble is we haven't talked enough about it.

The largest opportunity for greater control over all items of operating expense lies with the division superintendents of the American railways. How about standby time at engine terminals? An engine comes out of the yard, it isn't wanted, or something that was wanted on the engine isn't there, with the result that the engine stands still. Everything that makes a locomotive stand still uses fuel to no purpose, utilizes labor to no purpose, and every effort to prevent a locomotive from standing still will save fuel and will lessen the need for additional capital investment. The yard, as I have always seen it, wants engines ready whether the trains are ready or not; the roundhouse always wants time. There is a direct conflict of interest which calls for co-operation.

Get out of your head that this is a big problem or that it is wholly a scientific, technical problem, for it isn't; all the science and technique in the world is powerless unless it has back of it the determination to do the job right. Get into your head that it is the little things that count, one thing accomplished at a time, and you will make progress. Having made up your mind that a thing can be done, don't simply pass some resolutions at the end of this meeting and go home and forget all about it. Go home and tell your management about it, and that you believe in it. Keep in mind that the American people have a deep interest in what you, the superintendents of the American railways, are doing, have confidence in your knowledge, your ability and your

disposition to do everything that is possible through improved methods, and through greater diligence, and the measure of that confidence will be expressed as the results you attain are reflected in decreased costs and in increased adequacy of transportation.

P. E. Crowley Urges Activity

Railroad men, as a rule are not orators. However, I sometimes wish that division superintendents as well as other railroad officers might talk more in their contact with our patrons and the general public. For while railroad managements have by their recent accomplishments cured much of the unfriendly feeling towards the carriers, there still remains a small percentage of our citizens who persist in hostile attacks upon, and misrepresentations of, the railroads. These critics in the main are professed believers in government ownership and while it is probably impossible to convert or silence them, it is possible for the railroads, by continuous dissemination of facts, to prevent general misunderstandings and to maintain a fair and healthy public opinion. I realize that a superintendent who handles his division efficiently and well is doing all that can reasonably be expected of him, but still there arise opportunities for us all to give out true and constructive information that will be helpful.

It might be well to keep the public memory refreshed upon the point that we have had a long and varied experience in Government ownership of railroads and that the results were neither successful nor popular. Pennsylvania tried state ownership of railroads in early days, found it merely extremely costly to taxpayers. Michigan, Missouri, Illinois, Indiana and Ohio also had unsatisfactory trials of state government-owned railroads long ago. Some states were brought to the brink of bankruptcy before their ventures in railroad ownership could be closed out. Yet each and every one of these state-owned railroads afterward, under private ownership, proved useful to the communities it was built to serve and as profitable to its owners as the law would permit.

In spite of a clamor by a minority from the beginning of railroads to the present date for national government-owned railroads, we have managed to keep clear of such a radical departure from American business principles, except for the 26 months of Government operation to meet the extraordinary emergencies of the world war, until today we see our transportation machine larger, in a more advanced state of perfection and more efficiently and economically managed than ever before.

By every test and basis of comparison, the American railroads are fulfilling their duties of public service better today than ever in past history. You know this to be true, and I need not bore you with statistics of performance, but perhaps your familiarity with the facts leads you to neglect to do all that you might do to impress them upon the public mind. It is well to keep the true story of the railroad broadcasted, inasmuch as it is so creditable and so much of the welfare of any industry depends upon public sentiment these days. Such constructive work is merely good citizenship, and in doing it you will make yourselves as good citizens as you are railroad men. People are said to get the kind of government they deserve. If we do not take enough interest in our affairs to talk over our mutual public business with our neighbors, or to go to the primaries or conventions to participate in the election of our candidates for public office, or to walk a block or two to the polls on election day, perhaps we have no right to complain if our agents in Congress and the legislatures, in executive offices, oppress us with hurtful legislation. Let us not forget that being good railroad men in no wise relieves us from the necessity of being good citizens. And citizenship is not a passive condition, but an active responsibility.

In closing, let me say just a word on the relation of the division superintendent to the employees. Much can be accom-

plished by giving the employees an opportunity to talk with the superintendents. Do not ask an employee to come to the office. Some men would think that sounds too much like being called on the carpet. Go on the caboose and the engine occasionally and give the men an opportunity to know you. Give them an opportunity to talk with you, and you will find they will make suggestions that will be helpful to you.

If by chance an employee has made a mistake, always give him an opportunity to be heard. A good motto to follow is, "never suspend or dismiss an employee from the service until you have exhausted every other means." It costs the railroad considerable money to educate an employee, and when one has been educated, it is a serious matter to dismiss him and replace him with a man who is still in the process of being educated. Talk with the man who has made a mistake and give him an opportunity to talk with you. I venture the statement that five minutes' talk by superintendent with an employee who has made a mistake will pay greater dividends and bring better results than any 30 day suspension ever imposed.

Elisha Lee Outlines Problem

It is of vital importance for every superintendent and indeed all others who have to do with matters of administration, to realize that the genuine problems which confront, and often baffle, railroad management at the present time are no longer physical, but financial, political, economic and social. They include the problem of raising immense sums of money for tremendously costly improvements and extensions, the desirability of which, from the engineering and operating viewpoint, is obvious.

The superintendent has his part, and a very important one, in the solution of this problem. It is to make the operation of his division as efficient and economical as possible in order to help increase the net return, because net earnings are the only basis upon which credit can be permanently founded. The superintendent has slight influence on the question of rates, which are fixed largely by governmental agencies, but he can help indirectly to bring traffic to his road, and so increase the gross earnings, by making service dependable and attractive. And he should make it his particular business to see that out of every dollar of gross earnings the greatest possible number of cents should be saved to appear as net, insofar as the operations of his division are concerned.

I believe there is no more important duty which the superintendents can perform, at the present time, than that of taking the place of leadership in raising the standards of courtesy and politeness among railroad employees in general, in order to aid in encouraging an atmosphere of greater friendliness between the railroads and the public. The railroads have been criticized for being less alert than some other public utilities in appreciating the importance of making every personal contact by one of their employees with a patron an occasion for leaving pleasant recollections. Insofar as this criticism is justified we should work unremittingly to remove its cause. The superintendent is in a better position to do this than any other officer for the reason that the nature of his position gives him a greater radius and degree of personal influence over the rank and file than is held by any other officer.

The spirit of courtesy in the railroad must proceed from the top and must be more a matter of example and emulation than of formal orders or instructions. Nothing will be gained by elaborate directions to the rank and file to be courteous unless the officers in charge practice courtesy themselves, and their spirit of courtesy must be extended not only to the outside public but to their own subordinates of every rank and degree with whom they come in contact.

In the field of politics the superintendent should bear in

mind that he is, or should be, the senior representative of the company on his division. As such it seems perfectly proper that he should particularly concern himself with political and legislative questions affecting the welfare of his own road, or of the railroads in general. Whatever he does should be open and above-board and beyond possibility of criticism. It is, however, perfectly legitimate for him to point out the perils of proposed vicious legislation, and to use the prestige which his position carries, for the purpose of disseminating sound views upon political and economic questions, not only regarding transportation but upon all questions affecting his community or country as is the obligation and duty of every red-blooded citizen.

It seems also proper that the superintendent, as the ranking officer of his company, should take an active part in the commercial life of the communities which his division serves. He should know the leading business men and heads of industries and come in personal contact with them as much as possible. In this he should, of course, be careful to work in thorough co-operation with the representatives of the traffic or sales department of his company.

It is especially desirable for the superintendent to give careful consideration to this branch of his work. His earlier training in most cases will lead him to think primarily of the physical operation. Operation, of course, is and must be, his first concern but he should never forget that a railroad is a business enterprise and that from the viewpoint of the investors, whose savings and other funds have made its construction possible, it must earn fair and reasonable profits or be put down as a failure. The superintendent must therefore always have the commercial side of railroading in mind, and never forget that there can be no such thing as successful operation which does not also produce adequate commercial results.

R. S. Binkerd Urged Superintendents to Tell Their Story

Robert S. Binkerd, vice-chairman of the Committee on Public Relations of the Eastern Railroads, emphasized the necessity for the division superintendent giving consideration to the cultivation of a favorable public opinion in an address on Friday morning. He urged superintendents to take an active interest in activities in their communities and to perform all civic duties confronting them to show the public that they, as railway officers, are a part of the community life. This action on their part will also be reflected in the interest taken in such matters by the rank and file of the employees who are the "fingertips" through which the largest measure of contact with the public is established. He urged the superintendents to take every opportunity to bring the public to realize its dependence on transportation and its interest in the railways' prosperity. He urged further that railway officers should advise the public at every opportunity of the important relation which the railroads bear to the prosperity of the country as a whole since they are the largest corporate consumers in the country, having spent nearly three billion dollars for materials alone in 1923, in addition to providing a livelihood, directly and indirectly, for more than four million wage earners.

Report of the Committee

A report on How Transportation Officers May Best Improve Relations Between the Railroads and the Public, included papers on the subject by W. S. Williams, president of the Association; J. M. Condon, superintendent, Erie, Jersey City, N. J.; W. E. Brooks, general superintendent, Missouri Pacific, Little Rock, Ark.; W. F. Eckert, superintendent, Reading, Philadelphia, Pa., and W. H. Wright, superintendent,

Central of Georgia, Savannah, Ga. Mr. Williams' and Mr. Wright's papers are abstracted below:

Mr. Williams Lists Essentials

Among the essential steps in improving our relations with the public are:

1. Honesty. Never tell a patron anything but the truth, and, in this way, secure his confidence.
 2. Courtesy—On the part of all employees as far as it is possible to secure same. This requires constant supervision on the part of every officer in order that he may know that his employees, such as ticket agents, baggage agents, passenger trainmen, dining car men, Pullman car men, freight, train, engine and yardmen, freight agents and other employees, are dealing with the public in the most amicable manner.
 3. On-time operation of passenger and freight schedules.
 4. Smooth handling of passenger trains.
 5. Elimination of loud and boisterous conduct as well as profanity, around sleeping cars and passenger trains at stations—in fact, at all places on the railroad.
 6. When an accident occurs on the railroad, tell the public the truth about it as confidence can be lost more quickly by misrepresentation of facts than in any other way. Also, if you fail to give out to newspaper men the facts about an accident on your rails, they will, through their desire to get a story for their paper, naturally draw their own conclusions and the statement that appears may be more damaging than the truth would have been in the first place.
 7. Prompt and thorough investigation of all claims and prompt settlement of legal claims.
 8. Prompt handling of correspondence. Every piece of correspondence coming into your office, especially from an outsider, should be acknowledged immediately although the information requested cannot be furnished until after an investigation has been made. In making such an investigation it should be thorough and the party requesting the information should be given full and detailed facts, even though it may be necessary to have an officer of the company call on him personally.
 9. Employees should be trained in such a way that, when speaking of officers and conditions on their own railroad, if they have anything at all to say, it should be praise.
 10. Each local station, particularly the larger ones, should be supervised in such a way that when information is requested by patrons, either in person or over the telephone, vague replies will not be given and, if the party answering the call is not himself in possession of facts sufficient to answer the question, he should go to the pains of getting a man on the phone who can answer it and never tell a patron to call someone else. This also applies to division and general offices.
 11. Great strides can be made by following up the movement of L. C. L. or carload shipments, going out of your way, if necessary, to do so, as one good turn done for an outsider will bring forth untold favorable comment to the railroad.
 12. Officers should keep posted as to the cost of engines, different classes of cars, the construction of track per mile, the character and cost of block signals, the cost of different classes of service, etc., in order that they may intelligently answer questions that are frequently asked by the public. An officer should never miss an opportunity to go into detail about his railroad, the operation, etc., with outside people, as it has been my experience that many prominent men become very much interested when you go somewhat into detail as to railroad operation and oftentimes their opinions concerning the railroads are considerably changed.
 13. Infringement of rules should never be overlooked by an officer, regardless of how small it may be, as if violations are permitted to continue in a small way they will later grow into greater ones and result in serious accidents.
 14. Grievances and complaints from employees should be given the most careful consideration, whether or not you believe that there are any real grounds for complaint, as the employee making the criticism was conscientious or he would not have taken the matter up in the first place. Such recognition stimulates a friendly feeling between the employees and the officers, and goes a long way towards the creation of a more friendly relation with the public because of the good thing employees say about you instead of the bad.
- All of the above obligations rest upon the shoulders of the transportation officer. It is his job and his advancement usually depends upon his courteous actions and success in operating the job that he has before him.

Mr. Wright Defines Service

We in the transportation business are responsible for the attitude of the public towards the railroads. It is a responsibility that should weigh heavily upon all of us. It is possible for us, by our conduct, to induce in the public a tolerant and kindly disposition towards us and towards our railways.

The idea upon which the public relations campaign of the Central of Georgia is based is that public sentiment, when accurately informed, is fair-minded and that the obligation rests upon transportation to furnish correct information, from which conclusions may be reached. With this idea in view the president issues once per month a statement about transportation affairs in general and those of the Central of Georgia in particular, which is published in each daily and weekly newspaper along our lines. He also issues a monthly bulletin, under the name of Talking Points, primarily for circulation among the employees of the railway. He desires to have the employees discuss transportation matters with their friends, patrons of the road, and with the people generally. However, he recognizes that it is better for them to keep silent than to say the wrong thing or to give out inaccurate information; therefore, the bulletin which I have mentioned discusses topics of current interest on our own railroad and in the transportation world at large. It places at the disposal of employees up-to-date and interesting information in simple and non-technical languages.

There is no secret about the railroad business and it is our policy to take the public fully into our confidence. In pursuance of this, employees, particularly those who come in direct contact with the public, such as ticket agents, trainmen and operating men generally, are expected to know something about their own department; about the railroad by which they are employed, and also about the general situation.

We are urged to keep in touch with the traveling and shipping public, to have an intelligent answer ready for their questions, and to be able to talk truthfully and interestingly to them about matters connected with our vocation. We are not expected to go around with a chip on our shoulders looking for arguments, but we are expected to be able to refute false accusations.

On a railroad the size of ours we are able to preserve the personal touch with our patrons. We are expected to know the shippers, the officeholders and the newspapermen in each town on our division.

We are under instructions to give full and frank information about any happening. If it is an accident, we are to give out the details. If it is something regarding business conditions, we are to give our opinion and what information we have. If a newspaper man gets wind of something that is not quite ready for publication, the best plan is to take him into your confidence, give him what details you have at hand, and request him to hold mention of it until such time as you are willing to have the item appear.

It goes without saying that in any discussion of public relations, cheerfulness and courtesy must have consideration. The best courtesy is the ability to supply what the patron desires.

Neatness ranks right along with courtesy and cheerfulness in winning public good will. The employee who is neatly dressed and clean shaven makes a much better impression than the man who is careless or indifferent about his appearance. The man who is careful in his personal habits is also apt to see to it that the equipment under his control is in good condition, or that the station is well kept and clean.

All of these things might be lumped together under the head of satisfactory service. For the right sort of service implies honesty, punctuality, courtesy, and loyalty.

Discussion

In discussing this report W. C. Myers, East St. Louis and Suburban, East St. Louis, Ill., described a practice which that road instituted six years ago which has created much good will. In handling a heavy suburban traffic, it happens occasionally that a patron loses his purse or has his pocket picked. In such instances the company gives him a ticket. In the period in which this plan has been in effect, approximately one hundred and fifty persons have been served in this way with no loss and with the gain of much good will.

Several Timely Topics Were Considered

Among the reports presented were a number on topics which are now receiving special consideration from operating officers. These included the Classification of Freight Trains to Avoid Intermediate and Terminal Switching; the Substitution of the 19 Order for the 31 Order; Long Engine Runs and the Maintenance of Manifest and Time Freight Schedules. Abstracts of these reports follow:

The Classification of Freight Trains

The proper classification of freight trains and the operation of terminals should not be handled as a local or division problem, but for the entire system, with due regard to the movement of cars through to final destination or terminal on the system. Where the tonnage is available, good results can be obtained by confining loaded cars to solid trains and empty cars the same. Also when it is necessary to handle empty and loaded cars in the same train, and where the make-up and conditions will permit, empty equipment should be handled in the rear of the train, classified in the same block order of destination as the loads. This suggestion, in the matter of separating loads and empties, is both in the interest of economical train handling and to avoid the emergency, at intermediate yards, of switching out empties to move loads or reduce tonnage.

In making up solid trains or solid blocks for various destinations, considerable delay to shipments at destination may be saved by the classification of commodities. However, with the exception of merchandise cars, in general this must be governed by local conditions. Such cars for one destination, placed together, will avoid extra switching on their arrival at final destination and will also permit the placing of such cars at the freight house in much less time than if they are mixed through the train or block.

The results that can be obtained from the proper classification of freight trains are many, among which are the improvement in the handling of freight and in the time freight connections at terminal and junction points, increased engine ratings on various divisions, better movement of trains over the divisions, reducing road overtime, reducing switching hours on the railroad as a whole, decreasing congestion of terminals, securing more miles per car per day, reducing per diem, etc.

Much switching can be avoided at the larger terminals by the preclassification of trains, especially during peak periods, by making up solid trains for a single connection or trains in blocks for various connecting lines at such large terminals. During the past

winter, with the heaviest business in history, and without blockade or congestion, two important lines entering Toledo, Ohio, were successful in classifying outside of Toledo, cars for various connections at Toledo, and moving such cars into Toledo in solid trains for the various connections, thereby eliminating a great amount of switching at that terminal.

In order to properly perfect such a plan, especially on larger systems, it is necessary that a careful study be made of the railroad as a whole, taking into consideration, along with the yard and terminal facilities, its geographic location, as the geographic location of some of the lines, while not permitting of the running of many solid trains, will permit of the running of blocked trains.

To obtain a successful functioning of this system and secure the co-operation of all employees, it is necessary that the entire handling be vested in one person clothed with full authority and reporting directly to the highest operating officer of the system. He should be furnished with sufficient assistants or inspectors to police the make-up of trains properly and insure the observation of the instructions pertaining to the proper classification and to prevent any change of the rules laid down for such classification, without his direct authority.

The committee recommended that copies of this paper be sent to the secretary of the A. R. A. and to the chief operating officer of each railroad in the United States, Canada and Mexico, with the further recommendation that the system be installed on all railroads; and on lines of two thousand miles, or more, that an officer be put in charge with the title of chief of yard and terminal operations. On lines of less than 2,000 miles the committee felt that it can be properly handled by the present officers in charge of operation.

The report was signed by Victor Parvin, chairman, superintendent, Ann Arbor, Owasso, Mich.; P. G. Walton, general superintendent, S. A. L., Hamlet, S. C.; C. C. Barnard, superintendent, U. P., Denver Colo.; J. M. Flanagan, superintendent terminals, St. L.-S. F., Kansas City, Mo.; J. W. Simons, superintendent, C. N. S. & M., Highwood, Ill.; G. C. Brown, trainmaster, C. & A., Slater, Mo. and J. M. Reines, trainmaster, C. G. W., Stockton, Ill.

Discussion

This report brought out active discussion. R. B. White, B. & O., described the practice of the Baltimore & Ohio in the operation of its "main trackers," whereby trains west-bound are made up at the originating terminals for movement intact to destination. He emphasized the importance of developing a system of car inspection to prevent the necessity

of removing cars from trains en route. On that road a car is given what is termed "A" inspection at the originating terminal, this being sufficiently thorough to insure the movement of the car to destination, barring accidents. Cars are then given a "B" or less thorough inspection at intermediate terminals to detect only the most serious defects. F. O. Coleman, M. & St. L., and P. F. McManus, E. J. & E., described the manner in which they have enlisted the co-operation of large shippers in so loading their cars as to bunch those for common points. J. L. Council, A. C. L., described the difficulty which he had experienced in the operation of solid trains in originating territory in Florida because of the large number of cars which it is necessary to pick up at connecting line points.

H. R. Saunders, C. R. I. & P., described the practice which his road has recently inaugurated of making up trains at Silvis, Ill., for movement intact to Denver, El Paso and Fort Worth. A. M. Umshler, I. C., stated that he had found it impracticable to operate solid trains of perishable shipments intact northbound into Chicago, because of the large number of cars which were diverted or reconsigned enroute. However, he has found this practice highly advantageous in the movement of manifest freight from Chicago to southern points.

G. O. Brophy, Union Pacific, stated that it is the practice on his road to make up solid trains at Omaha for movement through Ogden to Northern California points, through Salt Lake to Southern California and through Granger, Wyoming, to Idaho and Puget Sound points. He opposed the recommendation of the committee that authority for the administration of this system should be concentrated in the hands of a general officer, believing that it should be left to the division superintendents. In reply to this criticism Mr. Parvin stated that central control is necessary to insure co-ordination for this same reason that a general manager supervises the work of division superintendents. He also emphasized the fact that it was the intent of the committee to point out the possibilities of this subject rather than to formulate a definite plan as the conditions on each road are more or less peculiar to itself. He concluded with this statement that a study of this plan will surprise one as to its possibilities. In closing the discussion of this subject, President Williams urged each superintendent and general superintendent to ascertain the improvement which it is within his authority to effect, stating that when his road really became seriously interested in this practice, it was found to be not only practical, but highly advantageous.

The Elimination of the 31 Order

The committee on Train Rules presented a report on the Exclusive Use of the 19 Order and the Abolishment of the 31 Order, which is abstracted below:

The committee recommends the abolishment of form 31 and the use of form 19, based on information received from many railroad officers recommending the use of the 19 order alone. The advantages of this step are that (a) it avoids interfering with the dispatcher who may be sending other train orders at the time an operator wants to send the signature and get "complete to a 31 order," (b) it avoids delaying heavy freight trains to receive a 31 order since a 19 order may be handed to the conductor and engineer while the train is moving.

The second paragraph of Rule 211 of the Standard Code, makes the 19 order just as safe at a meeting point where superiority is restricted as the 31 order, reading as follows: "When a 19 train order restricting the superiority of a train is issued for it at a point where such priority is restricted, the train must be brought to a stop before delivery of the order."

While the committee recommends the abolishment of the 31 order, the option must be left to the officers of the various lines, and an addition to Rule 211 is suggested as follows: A 19 train order must not be used to restrict the superiority of a train unless the movement is protected by some form of block signal.

Some lines use the 31 order when receipting for a new time table, when a hold order is required or when protecting the con-

dition of the roadway. The necessity for the use of the 31 order for any of these items mentioned can be met with the 19 order in connection with the use of a clearance card, standard form —, showing thereon the numbers of all orders to be checked by the conductor and engineman against the order received. If the numbers shown on the clearance card do not correspond, the train must be brought to a stop immediately, protected, and a full understanding reached before proceeding. Rule 94, Standard Code, second paragraph, gives a train, after proper understanding, the right to change orders and proceed, for which no signatures are required.

Rule 217, Standard Code, reads "A train order to be delivered to a train in care of—." The use of the 19 order is safe when issued with a clearance card, and will avoid delays securing signature.

Rule 219, Standard Code—"An operator must not repeat or give the 'X' response to a 31 train order for a train which has been cleared, or of which the engine has passed his train order signal until he has obtained the signature of the conductor and engineman to the order."

The committee recommends that a 19 restricting order would meet all requirements by having the dispatcher withhold the order from the inferior train until the operator assured him that he has delivered copies to the engineer and conductor, and makes a proper record of the transaction. The presence of the conductor in the office or his signature is no guarantee that the engineer will not leave the station without the conductor or order.

In signing for a new time table a 19 order reading "Provide yourself with copy of— before leaving—" this order to be accompanied by clearance card and bulletin requirements would be as safe as a 31 order requiring signature.

It has been suggested to the committee that operators at all terminals, including intermediate terminals, report to the dispatcher "Clear train— with order—" which dispatchers should do, but this would not be necessary for operators at all points, except possibly where they have more than one order.

The operation of trains on double track and block signal territory without train orders is permitted except when necessary to operate against the current of traffic, and in such cases, the use of form 19 will suffice. For the safe operation of trains on single track in automatic permissive block signal territory, the use of form 19 will suffice.

Economies and improved train operation are being reported on numerous lines by the use of the 19 order and it has attracted such attention as to warrant its further use. Efficiency must be increased by making the best use of facilities available. Restrictions of various kinds frequently prevent enlarging facilities and that brings congestion under present operating conditions. To overcome restrictions, efficiency in the use of present facilities must be attained.

To avoid stopping trains where stops have heretofore been made at railroad crossings, junctions, end of double track, entering or leaving sidings or terminals, is the factor sought, with a view to securing economies in use of fuel, water, increased car miles per day, lessening time of crews on road, etc., so that greater efficiency in train service can be secured. In connection with the more general use of the 19 order, improved signaling is attracting the attention of operating officers to such an extent that every improvement in the use of signals to facilitate movements of trains, lessening hazards, etc., is being welcomed, and the advantages of signal installations is becoming more and more appreciated on account of the benefits in train operation resulting where up-to-date signaling has been applied.

The report was signed by J. M. Walsh, chairman, superintendent, Y. & M. V., Memphis Tenn.; W. T. Quirk, general inspector of transportation, A. T. & S. F., Los Angeles, Calif.; C. A. Mitchell, superintendent, N. Y., N. H. & H., Hartford, Conn.; J. W. Cuineen, assistant superintendent, C. N. E., Danbury, Conn.; F. H. Fishback, master of trains, L. & N., Louisville, Ky.; R. T. Burdette, trainmaster, C. & A., Chicago; F. H. Hadley, train rules examiner, Penna., Wilmington, Del., and C. A. Bates, superintendent, W. & L. E., Brewster, O.

This report was accepted without discussion.

Long Engine Runs

The Transportation committee presented a report on Long Engine Runs, an abstract of which follows:

The experience of the St. Louis-San Francisco will prove of considerable interest. The following table shows between what points such runs are being made, the class and weight of engine, the kind of fuel used and the number of cars or tonnage being hauled:

	Class of service	Miles	Class of engine	Weight, lb	Fuel	Train
From St. Louis to Oklahoma City.	Pass.	542	Mountain	582,700	Oil	10 to 16 cars
Kansas City to Oklahoma City.	Pass.	379.3	Pacific	425,500	Oil	10 to 12 cars
From Kansas City to Ft. Worth....	Pass.	571.8	Pacific	377,300	Oil	8 to 10 cars
From Memphis to St. Louis.....	Pass.	305.4	Pacific	377,300	Oil	8 to 10 cars
From Kansas City to Memphis....	Pass.	483.9	Pacific	425,500	Coal	7 to 9 cars
From Kansas City to Memphis....	Pass.	483.9	10-Wheel	320,550	Coal	4 to 7 cars
From St. Louis to Springfield	Freight	239.3	Santa Fe	569,600	Coal	2,500 tons

The engines in passenger service make as high as 10,000 miles per month, and are expected to make between shoppings 100,000 to 150,000 miles, and do this very nicely.

On the runs between St. Louis and Oklahoma City four separate engine crews man the engine from initial starting point to destination; three engine crews man the engine on runs between Oklahoma City and Kansas City; four crews man the engine on coal burners between Kansas City and Memphis, and two crews man the engine between Memphis and St. Louis. On the coal burner freight power between St. Louis and Springfield, two crews man the engine.

The fuel consumption on engines that run through terminals will average 15 per cent saving as compared to engines that cut out. In addition, it is possible to reduce forces on account of fewer engines handled at division points. It is also necessary to keep the power in a higher average physical condition. There is no increase in the number of engine failures due to power running over several divisions. The fact that the physical condition of the power is brought up to the exacting requirements of service, is resulting in a better condition of power than otherwise obtained.

Grease cups are filled at intermediate terminals, lubricators filled; on coal burners fires are shaken down and requirements of standards of engineers and firemen are observed by the management. No separate cost figures of repairs are available. One striking result of running engines over more than one division is the rapidity with which the engine gets its mileage and the improved condition of the engine, which is especially noticeable in the firebox and boiler condition. It is also noticeable that where the railroad fills rod cups and lubricators, and sees that its engines are supplied with sand and supplies the enginemen are favorable to running power through division terminals. They do not have to show up for duty as early as they would otherwise, or have to prepare the engine for service other than oiling engine around on a train.

Quality of Coal and Water Paramount

The report contained a letter from W. E. Brooks, general superintendent, M. P., from which the following is taken:

The first and most important consideration in the study of this subject is the location of water and fuel supplies, and their quality. It has been found unsatisfactory, if not impossible, to operate locomotives beyond a certain distance in some sections of the country because of the difference in the quality of water. It is also difficult to operate locomotives over territories using two or more widely differing grades of fuel, because of the difficulty in drafting them so as to produce steam. With limited experience, I should say that only locomotives equipped with wide fireboxes can be made to serve satisfactory on runs of 300 miles or more without excessive delay at some point on account of fire conditions.

However, when the conditions are favorable, the economy in long locomotive runs is apparent, and the problem then resolves itself into the education of the men handling the engines. This requires personal practical experience, diplomacy and untiring patience on the part of the road foreman of engines or traveling engineer. It appears to be no trouble for some firemen in territory where coal is used for fuel to bring fires into terminal, where they turn the engines over to other crews as bright and clean as though their engines had only made a few miles, while others experience difficulty in bringing about this result, even though they may be most sincere in their efforts. On all runs of more than 150 miles relief engines should be maintained at one or more engine terminals for the reason that in the event of a fall-down no relief could be furnished other than freight power, and in many instances freight power cannot be made available without delay.

When coaling stations are more than 100 miles apart, an organization should be provided to shovel coal ahead within each of the fireman. The weight of the train and the work it has to do will control this feature and locomotives making such runs should have the same attention at each end of the run that they would receive at their home terminal if the run was 150 miles or less for locomotives will not perform successfully on runs of this length when all the repair work is done at one end of the run.

The members of the committee are E. L. Magers, chairman, superintendent, St. L.-S. F., Springfield, Mo.; J. H. Aydelott, general superintendent, C. B. & Q., Galesburg, Ill.; W. J. Atkinson, superintendent, C. N., Quebec, Que.; W. E. Brooks, general superintendent, M. P., Little Rock, Ark.; J. J. Cahill, trainmaster, N. Y. C., Utica, N. Y.; W. F. Eckert, superintendent, P. & R., Philadelphia, Pa.; John Leppla, superintendent, C. & N. W., Antigo, Wis.; W. C. Morse, vice-president and general manager, L. R. & N., Shreveport, La.; W. H. Wright, superintendent, C. of G., Savannah, Georgia, and J. M. Condon, superintendent, Erie, Jersey City, N. J.

Discussion

This report brought out a sharp difference of opinion. J. M. Walsh, Y. & M. V., characterized long engine runs as still being in the experimental stage and advocated assigned engines as being more economical while T. P. Horton, C. M. & St. P., G. O. Brophy, U. P., and others contended that this subject is no longer open to question, but has demonstrated its practicability. Mr. Horton stated that the division on which he is employed in Wisconsin, started running engines 450 miles last winter with success even during adverse weather. Mr. Brophy described the practice of the Union Pacific in running freight engines more than 300 miles successfully, thereby avoiding delays to engines and securing greater service from the equipment. The consensus of opinion of those present was indicated by their approval of a recommendation favoring long engine runs and urging those railways which have not yet tried this plan to give it serious consideration.

The Maintenance of Manifest and Time Freight Schedules

A report was presented on the maintenance of fast freight schedules, which is abstracted.

Whether the service consists of one fast freight each 24 hours or multiples thereof spaced equally throughout the 24 hours, or a fleet of trains handling perishable traffic to meet fixed market arrivals, the schedules should be given the same consideration in preparation as is given to passenger train schedules. They should be slow enough to permit of accomplishment in every-day operation and still be fast enough to provide the expedited service expected by the public. Where such service has been operated for some time the actual record of performance on each engine district and through terminals should be reviewed periodically for the purpose of making such revision in the schedules as has been demonstrated to be necessary to maintain it or make such change in method of operation as will permit successful maintenance as advertised.

It is the opinion of this committee that this class of trains may be operated successfully without material sacrifice of remunerative tonnage per train after the schedules have once been fixed by actual demonstrated performance, but when delayed to any extent leaving the originating terminal the character of traffic and the necessity of making delivery at a certain time may require a reduction of the tonnage. In the case of a member line handling a considerable volume of perishable traffic which must be delivered at a certain time in the morning for that day's market, there is a system of loading these trains on an adjusted basis, designed to give the engines hauling the trains all the tonnage they can handle and make the required time. The adjustment consists of dividing the day into three periods on each superintendent's district; these periods are designated as "maximum," "regular" and "delayed." The maximum loading is used for trains which, for one reason or another, have gotten well in advance of the required schedule. Regular loading covers the operation of trains running about on schedule and delayed loading applies to those trains which are running behind the schedule and must make up time in order to secure on-time arrival at the final terminal. On the above basis the regular tonnage is 11 per cent below the maximum and the delayed rating is 28 per cent below the maximum. Such an adjusted loading system becomes important from an economic standpoint in the operation of a manifest freight schedule when the volume of business offered for that schedule requires the operation of a number of sections, some of which can be dispatched ahead of the schedule with others running on or behind the time which it is desired to maintain.

These trains should be given the most careful inspection and attention at the originating point to avoid delays on account of

hot boxes or other defects and should receive the same kind of attention promptly at intermediate points of inspection.

The provision of sufficient classification room in yards is of growing importance as the density of traffic increases for the reason that if the schedules required by the nature of the traffic are to be maintained it is necessary that (a) trains be properly classified out of terminals for set-off purposes on line of road; and (b) sufficient classifying tracks be maintained at each terminal (especially originating terminals) so that cars from warehouses may be brought to the assembling yard promptly and may be classified without delay. A sufficient number of such tracks permits enough classifications to accomplish the necessary separation as freight is received during the day, leaving a minimum of switching necessary to be formed at the time warehouse cars or last deliveries are brought to the assembling yard for actual movement.

This committee believes that the generally approved practice is to assign regular crews to these trains, or that the best results will be obtained by such a practice. When so assigned the crews take a greater interest in getting the trains over the road and as they become familiar with the difficulties incident to the operation of one or more of these schedules they can take advantage of every opportunity to advance the movement. They can also render valuable aid by making suggestions when time table changes are contemplated and their constant association with the handling of this class of traffic creates an intense pride in the movement of same and a personal activity in solicitation of their own accord to secure more business for their line.

Members of the committee are F. W. Brown, chairman, assistant to general manager, A. C. L., Wilmington, N. C.; E. J. Devans, general superintendent, B. R. P., Du Bois, Pa.; S. S. Huffman, assistant superintendent, C. & E. I., St. Louis, Mo.; J. A. Lucey, superintendent, M. & St. L., Minneapolis, Minn.; D. F. Milne, general superintendent, N. Y. C. & St. L., and A. C. Van Vliet, assistant general manager, Union Terminal Railway, St. Joseph, Mo.

Discussion

This report was received with great interest. In opening the discussion President Williams deprecated the trading of

speed for traffic with the resulting necessity for the reduction of train loading to make the schedules. He opposed the scheduling of any train at a speed greater than 25 miles per hour, although many schedules now in effect require operation at 40 miles. Numerous other members supported Mr. Williams in his contention and criticized the promising of schedules to shippers which the operating department cannot maintain economically. F. O. Coleman, M. & St. L., emphasized the importance of regularity of delivery as more important than speed.

J. M. Walsh, Y. & M. V., emphasized the necessity of fast schedules to serve the shipping public adequately and opposed any action on the part of the association looking towards the adoption of resolutions favoring slower schedules, pointing out the competition which exists between markets as well as between roads. W. H. Wright, C. of Ga., J. F. Council, A. C. L., and others agreed with Mr. Walsh that the present schedules can be maintained if trains can start from loading points on time. They believe that track and equipment properly maintained should be safe for schedules of 35 miles per hour. W. G. Templeton, N. C. & St. L., and G. O. Brophy, U. P., believed that any effort to lengthen schedules would be a step backward and emphasized the importance of educating the shipper in loading to meet the established schedules as the direction in which relief can be secured most readily.

A. M. Umshler, I. C., and A. J. Connolly, Union Freight Railway, Boston, referred to the abuses which exist in the adjustment of claims for failure of traffic to make the advertised schedules. They also emphasized the fact that much traffic which moves on these schedules is of a character which does not justify the rapid movement given it.

Increasing the Efficiency of Operation

The convention also considered a number of subjects designed to increase the efficiency of operation, including the Loading of Equipment to Capacity, Increasing the Miles per Car per Day, Maximum Train Loads and Terminal Operation.

Loading Equipment to Capacity

The full loading of cars was emphasized in a report presented by E. H. Harman, superintendent, Wiggins division, Terminal Railroad Association of St. Louis, an abstract of which follows:

The loading of equipment to its maximum capacity increases the available car supply, decreases the empty car miles, increases the miles per car per day, increases the capacity of terminals by reducing the number of cars to be handled, increases the net tons capacity of trains, increases the facilities of engine terminals and industrial districts, aids the distribution of equipment and saves coal and expense of train crews.

The cost of handling L. C. L. freight has increased gradually through the medium of maintained overhead that cannot be reduced as the tonnage reduces. It is necessary to operate a certain number of peddler cars, regardless of tonnage. Although many expedients have been tried to reduce the number of cars and increase the tons per car there are always such serious service objections that efficient car loading is delayed. Competition between railroads is not alone the governing factor; there is the ever-important factor of competition between jobbing centers, the latter involving so much in the way of policy that L. C. L. carload maxima becomes a secondary consideration.

Considering the fact that the merchant is buying closer each year, his shipments have become smaller and their delivery more urgent and it has become the practice to accede to this demand for a modified express service. The railroads suffer most in the loss of tonnage to the interior stations, and instead of encouraging a slower regular delivery, there is the constant effort at speed, whether practical or not, all of which retards the effort toward heavier car loading. By working into the consolidation plan of peddler cars, regularity of delivery can be accomplished and a

vast improvement in car efficiency. On the average railroad it is not at all uncommon for one-way freight to peddle out of five or six cars over the same route on the same day, which indicates that a consolidating point would have released five cars immediately for loading and also reduced the overtime of the way-freight crews. In many cases these peddler cars are operated out of jobbing centers to remote territory 300 miles away; such service is the heritage of the days before the multiplicity of local jobbing houses, and close buying of the small-town merchant.

The following measures warrant careful consideration:

1. Careful consideration should be given to the cubical capacity of new cars ordered, as well as rebuilt cars, in other words the body of the car should be built large enough to carry the journal load of the semi-heavy commodities.

2. Under the plan of greater necessity for economical transportation shippers should be urged to load full cars and consignees to buy full cars. An average increase of one ton per car on any large railroad will reduce transportation operation enough to pay the expense of any large terminal. A fully loaded car is equally as important to economical operation in times of car surplus as in times of shortage.

3. A careful study of tariff minimum weights should be made with closer co-operation between tariff committees and transportation officials in establishing new or changing old minima. Minima on all heavy commodities, the density of which will permit maximum load limit loading sold in carload lots and not affected by trade conditions, should be fixed at car capacity.

The committee offered the following resolution:

Resolved, That the members of this association pledge themselves personally, and through their subordinate officers, to solicit the co-operation of shippers of freight in their respective territories in intensifying the loading of equipment to maximum capacity.

That an effort be made to educate the car supply departments to discriminate carefully in furnishing cars of capacity coinciding with the character of the commodity to be loaded, giving cars of low capacity to shippers handling commodities providing for low minimum, such as household goods, etc., and cars of high capacity to shippers of heavy commodities, such as ore, etc.

Members of the Committee on Arrangements which submitted the report are E. H. Harman, superintendent T. R. R. of St. L., St. Louis, Mo., chairman; K. W. Fischer, inspector of transpor-

tation, C. B. & Q., Chicago; D. D. Webster, trainmaster, L. V., Cortland, N. Y.; E. H. Powell, trainmaster, A. C. L., Rocky Mount, N. C.; F. W. Curtis, superintendent, M. St. P. & S. S. M., Minneapolis, Minn.; W. J. Hills, superintendent, N. C. & St. L., Paducah, Ky.; W. P. Smith, assistant superintendent, St. L. S. W., Pine Bluff, Ark.; and H. G. Hulse, trainmaster, N. P., Staples, Minn.

This report was received without discussion.

Maximum Miles Per Car Per Day

A paper on the maximum miles per car per day was submitted by A. C. Showalter, superintendent, New York, Chicago & St. Louis. It read in part:

Each junction point and terminal should be checked closely to insure daily delivery of every possible car to connection. Each agent should be required to report outbound cars promptly. Industries and individuals should be constantly urged to hurry the release of equipment. Industrial, house and team tracks should be switched with unfailing regularity—cars lined up and moved at the first opportunity.

Crippled cars should be given special attention—sufficient track room should be provided to make it possible to separate the "heavies" from the "lights" and a real effort made to reduce the cripples to a minimum. Repair tracks should be spotted several times a day, if necessary. Hot boxes and other defects which make it necessary to cut cars out of trains should be reported and investigated promptly—repairs should be rushed and arrangements made to move them with the least possible delay. Failure to work sufficient yard power may be termed false economy, as it not only results in slowing up yard work and reducing the miles per car per day, but also increases the per diem account.

The proper maintenance of road and yard power, as well as adequate and efficiently operated terminal facilities are important factors in increasing car mileage.

At points where there are several classification yards in a single terminal, widely separated, it will be found advantageous to operate pullers from one yard to the other on schedules. In this way each yard knows just when to expect the cars and arrangements can be made to handle without delay.

This report was received without discussion.

Maximum Trainloads

A report on Maximum Trainloads was presented by R. B. White, general manager, B. & O., New York City. This report follows in abstract:

The main factors in obtaining a maximum trainload are as follows:

1. Establish a practical rating for the engine. It is our opinion that the most desirable method for accomplishing this is to take the theoretical tractive power of the engine and establish a so-called theoretical rating, this to be followed by actual tests on line and road, conducted, where possible, with a dynamometer car.

2. Require every engine to haul this rating the greatest distance possible. The method described in paragraph 4 will, to a very large degree, enter into this situation, but the important essential is to confine the authority to reduce the tonnage rating established to as few men as possible and preferably to the chief train dispatcher alone.

3. Require all trains to do all of the time what some of the trains do some of the time. This subject is of sufficient importance to warrant a paper on it alone. We hope to touch briefly on the points which we regard as most important:

- (a) The proper building of the train in the yard so that the train will run intact as far as possible, which involves proper classification of freight and confining local work to the fewest number of trains.

- (b) The calculation of tonnage to be delegated to an employee competent to make such calculations and one who has been thoroughly instructed with reference to the ratings. Where the volume of tonnage handled is sufficient we recommend the use of computing machines for this purpose and the taking of tonnage records from the waybills.

- (c) On low-grade lines where the trains are long and the possibility of interruption to service by equipment defects is of sufficient importance, consideration should be given to the marking of all weak cars in the receiving yard and they should be switched separately and run in trains at reduced tonnage as often as the accumulation will permit, but at least once every 24 hours, thereby eliminating the weak car from the heavy tonnage train, avoiding the necessity of switching cars on line and running other trains out

light to move them, and delays, etc., which accompany such occurrences.

- (d) Prepare for each yard a list of calling times, indicating the time at which trains may be called, providing a sufficient number of calls to move the maximum number of cars to care for the business and have such list made with the view of avoiding conflict with other train movements and then prohibit the running of trains at times other than those shown.

- (e) The importance of providing a standard performance for tonnage freight trains over a freight district is very important. A standard performance, when reached and agreed upon, can then be used as a standard by which all other movements may be judged.

4. Devise a regular and accurate method of obtaining statistics indicating what the engines are actually handling, so arranged that the information will reach those concerned in the shortest possible time after the train has been operated and with it a system for following up the trainload closely so that the attention of the officers responsible is called immediately and constantly to the failure of engines to handle the proper tonnage when such cases occur.

The question of adjusting the tonnage rating on account of temperature variations has received a great deal of thought and study. It is our feeling that rather than resort to a percentage reduction as temperature drops, it is better to maintain the same rating for the engine and increase the adjustment with temperature variations, the ratings under the adjustments, under such circumstances, to be designated by the letters A, B, C, and D; A being full rating, temperature above 35 deg.; B, 20 to 35 deg.; C, 0 to 20 deg.; D, below zero. It is generally known that tonnage trains are affected first by cold weather. It is also recognized that trains which make almost continuous runs without stops are not affected as much by cold weather as trains on lines where the operating conditions require frequent stops and sometimes long delays. The effect of high winds is, of course, the same, regardless of the above conditions, and it follows, therefore, that the combination of high wind and cold weather should be amply compensated by reduced ratings, as not only is the train resistance increased but the loss of power on the engine affects its hauling capacity. It is difficult to predict always the conditions a train will encounter on its trip, but the following should be carefully considered: (a) Trains leaving a terminal in the afternoon will have the lower night temperature to meet. (b) Trains starting after midnight will find operating conditions better after the sun is up. (c) Trains starting a run in low altitudes will find colder weather in the mountains. (d) Trains starting in mountains may often take on tonnage in the low lands. (e) Trains having many stops and starts will be affected by cold more than trains running continuously. (f) Trains starting up grade leaving a terminal will handle larger ratings if helped leaving the terminal for 20 min. until the journals become warmed. (g) The location of passing sidings plays an important part in rating trains in winter. If sidings are in such position that a train starts out on a downgrade or on a grade substantially less than the ruling grade, larger ratings may be handled than where sidings are located on ruling grades. (h) If trains move out of a terminal promptly and put in time on the road instead of standing in yards a better rating may be handled than when a larger part of the allowable time is being consumed in doing nothing.

High speed is not essential, but to the contrary is somewhat detrimental and it is therefore our recommendation that the speed of slow freights be restricted to that which will permit of an engine handling its full tonnage over the line easily and without overtime.

We have purposely omitted any preference to fast freight or local freight ratings for the reason that the requirements of the service on an individual line will determine very largely the ratings that it is necessary to establish. We suggest, however, that the ratings be established in exactly the same manner as for tonnage freights and that the same consideration be given in establishing a standard so that a maximum train load, not only in fast freight, but also in local freight will be obtained, and that the same statistics and follow-up system be used. A careful check of freight moving under fast freight billing is also essential as frequently freight found so moving is not entitled to fast freight movement, increasing unnecessarily the number of fast freights operated, with a disastrous effect on train load.

Train loading has to be worked out on every division, there being two essential rules that must be considered in order to get the best results, namely, tonnage and time. To handle heavy tonnage on a single track railroad when traffic is dense, thereby consuming too much time, is more expensive than handling a lighter train load at a faster speed. The problem, therefore, is to find out the economical train load. On some divisions the cost per ton mile on fast freight is lower than on tonnage freight for the reason that the fast freights can be kept moving practically all of the time while the tonnage freights are required to remain in side tracks for the fast freights and other trains to pass. On other territories the reverse is true.

The report was signed by A. E. Boughner, chairman, superintendent, M.-K.-T., St. Louis, Mo.; R. B. White, general manager, B. & O., New York City; J. W. Smith, general manager, I. H. B., Gibson, Ind.; S. P. Henderson, superintendent, C. & A., Bloomington, Ill.; P. F. McManus, general superintendent, E. J. & E., Joliet, Ill.; J. D. Stack, general superintendent, D. & R. G. W., Salt Lake City, Utah, and H. S. Balliet, assistant general manager, Grand Central Terminal, New York City.

This report was received without discussion.

Improving the Efficiency of Terminals

Charles Burlingame, superintendent, Terminal Railroad Association of St. Louis, prepared a paper on terminal operation, in which he said in part as follows:

Classification tracks should not be too long, for if they are, there is a temptation on the part of yardmen to wait until they get a track full before running it. There should be plenty of tracks so there will be one for each classification. Neither should the engines be too large otherwise there is again the temptation to wait and run too long trains.

Another thing which adds much to the efficiency of an organization, particularly in terminal work, is to keep regular men on the jobs as much as possible. The importance of care in selecting and training men is paramount. A man who has been employed a year or more is worth two new men from the standpoint of safety and efficiency. One of the most important duties of a superintendent is the selection of men. Frequent turnover is very costly. There should be a careful selection and then everything possible should be done to make the position pleasant and keep the men satisfied so that they will stick, for permanency is only another name for efficiency.

One of the fundamentals of efficiency is to have enough clerical help in the superintendent's office. Keeping a good record of all transactions saves confusion and delay. An efficient and capable clerk who knows the right thing and does the right thing without having to be told, will often save as much as a crew out in the yard in the course of 24 hours by keeping a check on connections; watching the movement of perishable freight, investigating delays to home crews on foreign rails, tracing the movement of crews between connections, checking to see that deliveries are switched in the order received and that classification tracks are cleared regularly, checking with the assistance of yard clerks, crossovers between yards when more than one classification is necessary; specializing in getting bad orders to and from repair tracks to make up all the time possible by reason of such cars having to be taken out of the current of traffic; and analyzing "Hold" tracks closely to ascertain why cars go there and check the causes as much as possible. Lively action in the superintendent's office leads to activity all down the line. If a foreign road understands that you are right after it when your crews are delayed on its rails it will give home crews more than passing at-

tention, and if you get after its crews that are guilty of slow movement on your rails all foreign crews will get the habit of sitting up and taking notice as soon as they strike your rails. Activity is contagious and when it emanates from the superintendent's office it radiates all through the organization.

A loaded car without a waybill is of no use to anyone. Every possible effort should be made to get a waybill with every car delivered. Any tendency to run the cars and let the bills go the best way they can should be checked. Loads should not be set back on account of some defect in billing or some similar reason, until every effort has been made to get a correction by telephone.

As a means of expediting actual operation and for general supervision, especially in large terminals, the telephone should be recognized more thoroughly. While a fair start has been made in the installation of railroad telephone service, much greater expansion is desirable. Private lines independent of exchange switchboards, connecting yardmasters' offices on the same system, paralleling and augmenting train dispatchers' lines and private lines or automatic phones connecting yard and freight officers of separate systems, are necessary to relieve the overburdened manually-operated switchboards. A phone which is always busy is worse than none to parties who get nothing else but "busy."

Wherever practicable, an engine of one road which goes with a delivery to a yard of another, should haul a train back. This avoids light engine movements. If not, some kind of a reciprocal arrangement should be devised whereby one line does all the receiving and delivering for a period of 60 days, and then the other line takes care of the interchange for a like period, thereby avoiding the extravagance of light engine movements, which are very expensive, when one considers that a delivery crew costs about \$65 for every eight-hour period worked. In some places profitable arrangements could be made by taking a short route with deliveries over another road's tracks and paying trackage.

Have you ever noticed what a scarcity of railroad operating literature there is in this country, notwithstanding the fact the most important branch of the railroad business is the actual handling of trains and cars? An exchange of views is conducive towards improving the science of operation, because it is through a free exchange of ideas that we find the greatest growth and development. It would benefit a railroad to supply its operating officers with the *Railway Age* and the *Railway Review* so that they can see what is going on and keep pace with current thoughts and ideas. It would well pay every railroad president to see that his officers are supplied with literature about their business, showing new developments in efficiency, economies and safety propositions, even to advertising columns. The man who succeeds is the man who reads. Then these officers who are placed on the subscription list, after they get through reading these periodicals, should and do, in most cases, pass them among their subordinate officers. In this way a superintendent can keep his subordinates interested, informed and up-to-date. One single idea that a man may get out of a magazine will pay a railroad for all the magazines purchased for its officers for a whole year.

This paper was received without discussion.

The Prevention of Accidents

The reduction in the number of accidents was the subject of three reports and papers. F. E. Williamson, general superintendent, New York Central, read a paper on the Elimination of Personal Injuries in which he discussed grade crossing accidents and injuries to passengers and employees, and urged the establishment of safety departments to carry on the work of eliminating accidents in an organized way. W. S. Williams, general superintendent of the Illinois Central and president of the association, read a paper on the Grade Crossing Problem while the Interchange committee submitted a report on Yard and Train Accidents. This report and the paper by Mr. Williams are abstracted below.

Elimination of Yard and Train Accidents

The Interchange committee submitted a report on yard and train accidents which is abstracted below:

In eliminating train and yard accidents, the human element is of first importance. The type of employee determines the quality of work. If greater discrimination were used in the selection of new men for railroad service the number of accidents resulting from carelessness, indifference, inattention and lack of judgment might be decreased immeasurably.

Tireless supervision should be exercised to prevent violations, however trivial, of company regulations and discipline should be administered according to the gravity and costliness of the infraction. The yardmaster, if he is sufficiently in earnest, can control this feature as far as yard work is concerned, and if better work is done in the yards there will be fewer accidents on the road. As 95 per cent of the yard damage to equipment and contents of cars occurs between the hours of 7 p. m. and 7 a. m. it is obvious that the efforts of yard officers should be concentrated in bringing about an improvement during this period.

Competent inspection should be given constantly to insure the prompt repairing of all mechanical defects for the old adage holds true that an ounce of prevention is worth a pound of cure. The improper loading of bulky commodities, such as pipe, iron and lumber demands vigilance. An effort is being made to educate the shipping public in this particular, and also in the matter of closing car doors and hatches, but the responsibility still rests upon the employees, and in cases of unsafe loads the cars should be set out, if necessary, until the lading is rearranged.

Deraillments and sideswiping, the commonest of yard accidents, are almost invariably due to carelessness, and are traceable to some disregard of rules or instructions. Brakes not fully set permit cars to run out and corner other cars. Shoving a track without a man on the rear end often results in untold damage.

A train should be stretched on arrival at and just prior to departure from a terminal so that inspectors and trainmen are given an opportunity to see drawbars and draft timbers under strain. Defective cars should be set out before the balance of the train

is switched. In yard switching the number of cars in a cut should be limited except in cases of special permission from the superintendent. Cars loaded with stock, explosives, inflammables and highly perishable goods should be shoved to rest instead of being cut off against other cars. Kicking any cars with unnecessary force is always to be condemned.

Setting brakes on a number of cars and then switching cars against them, expecting the brakes to hold regardless of speed, is a bad practice, as is also that of taking a run for the cars in order to drive them into a track nearly full or near the capacity of the engine. An engine should not be reversed and brakes set at the same time in attempting to stop a cut of cars.

It should be remembered that there is one car length of slack in every 50 or 60 cars. Bunching the slack rapidly in shoving a string of cars or allowing the slack to run out quickly by stopping heavy engines with cuts of cars cannot fail to cause injury somewhere. In short switching it is possible to save time without causing damage by bunching or stretching slack moderately but in road switching, when air is used and the movement is slower, continuously bunching or jerking the slack damages both equipment and contents. By test of impact recorders it has been determined that the shock received by cars hitting each other at a speed greater than five miles an hour causes damage.

Members of the Interchange committee are G. G. Derby, chairman, superintendent, A. T. & S. Fe, Chanute, Kan.; H. Weitzel, general superintendent shops, S. P. of Mexico, Empaline, Son.; A. W. Brant, assistant superintendent, L. & N., Louisville, Ky.; C. E. Coutant, assistant superintendent motive power, Wabash, Decatur, Ill.; J. J. O'Brien, superintendent car department, T. R. A. of St. L., St. Louis, Mo.; H. H. Brown, superintendent, St. L.-S. F., Fort Scott, Kan.; E. M. Wilcox, master car builder, I. H. B., Gibson, Ind.; D. T. Crawford, superintendent, G. T., Battle Creek, Mich.; W. H. O'Keefe, superintendent terminals, M. C., Detroit, Mich., and J. L. Wilkes, president and general manager, Jacksonville Terminal Company, Jacksonville, Fla.

This report was received without discussion.

Discussion

The maximum speed of cars at time of impact was a topic of active discussion. M. G. McNerny, B. R. & P., maintained that five miles per hour was too high where cuts of several cars were involved. Others, however, considered six miles permissible. G. P. Shreeve, Belt R. R. of Chicago, stated that extensive tests with shock recorders have shown that the shocks are greater in flat than in hump yards and that the former are harder on cars and their contents.

J. W. Kreitter, D. M. & N., described his practice of placing markers at the clearance points on ladders to avoid sideswiping cars. Mr. McNerny described the installation of "winking" signals on yard leads, consisting of electric lights mounted on poles by means of which, with push button connections, switchmen can substitute flashing light signals for hand signals. This system has been found to possess marked advantages.

That portion of the report relating to the reduction of claims also received much attention. J. W. Walsh, Y. & M. V., described the meetings which are held monthly in the office of the general manager of the Illinois Central and attended by all superintendents, at which monthly reports of accidents are presented and discussed. He also described the use of impact registers by means of which they have been able to locate the source of rough handling and fix responsibility for it. By these practices the damage to equipment and contents have been reduced materially. G. O. Brophy, U. P., described the practice which was inaugurated on his road three years ago of holding safety meetings at terminals at midnight, so that the men going off work and those coming on duty at that hour could attend. By bringing before these men recent accidents and discussing their causes with them, it had been possible to reduce the accidents greatly. L. Podesta, C. J., stated that the installation of flood lights in yards on his road, had reduced the damage fifty per cent.

The Grade Crossing Problem

W. S. Williams, general superintendent of the Illinois Central and president of the association, presented a paper on the grade crossing problem which follows in abstract:

One of the outstanding facts that appears in any analytical study of fatal accidents on the railroads is the millions of passengers who are carried to their destinations safely. Last year, the total number of passengers transported one mile reached the tremendous aggregate of 38,005,922,000. The actual number of passengers carried was 985,908,000, and the average distance each one traveled was 38.55 miles. Yet, of that vast number, only 9 were killed in train collisions. During the same period 1,759 persons lost their lives in collisions between trains and automobiles at grade crossings. The train was a principal factor in both cases, but the responsibility clearly does not rest upon the train in the second instance but upon the motorist. I point out that the train cannot go to the automobile, but the automobile must come to the train to produce a collision. Three big railway systems did not kill a single passenger during 1923 by collision, derailment or otherwise; but these same railroads participated in grade crossing collisions wherein nearly a hundred persons lost their lives. What more proof is needed to establish that the railroads are not to blame for these fatalities, but that the fault lies with the drivers of motor cars?

There is, from time to time, a persistent and in some sections insistent public clamor for grade crossing elimination. The railroads have devoted much time and earnest attention to this subject and the following conclusions stand out: An accurate enumeration of the number of crossings at grade in the United States gives 256,362 as the present total. During a five-year period this total has not varied more than a few thousand. A limited number of crossings are eliminated year by year, the work depending primarily on available funds for this purpose. In 1922, for example, the number of crossings eliminated totaled 706 at an actual cost of approximately \$70,000,000. The expense of this work is its chief deterrent factor. Some roads have made a fairly comprehensive survey and prepared tentative estimates covering grade separation over a large area. From these calculations it has been computed that the entire cost of eliminating all crossings in the country would reach the staggering total of \$22,000,000,000. It must be taken into consideration, however, that the whole expense would not devolve upon the railroads, but in an appreciable measure the costs would be shared by states and municipalities.

Last year, an effort was made in the general crossing safety campaign on the Illinois Central to enlist the energies and interest of our employees in all departments and more especially the men in the train service, such as locomotive engineers and firemen. The results obtained from this movement have been excellent. Veteran engineers on all of our 18 divisions wrote letters to the newspapers in their communities, making a direct appeal to the public sense of fairness and sympathy, in many cases describing their own sensations of horror and nervous shock when unwillingly compelled to snuff out the lives of women and children because of some driver's lack of thought. These appeals struck a note of human accord in the public mind and created that willingness to assist in the cause of safety which makes co-operation possible.

An outgrowth of these efforts was a plan of organizing all employees on the system who owned or operated automobiles in what are called "Stop, Look and Listen" clubs. Members of these clubs are required to sign a pledge to stop and make sure that the way is clear before crossing all railway tracks. The company supplies each member with a metal sign to be attached to the rear of his motor car, said sign bearing the words: "This Car Stops at All Railroad Crossings." The effect of this plan was gratifying in its appeal to popular favor. A census of the system on March 1 of this year showed that 10,736 employees own or operate motor cars. Of this number 9,409, or 97.6 per cent, had become members of the clubs.

The general public quickly took hold of the idea and applications for membership from motorists other than employees poured in. Such persons are now accepted in full membership and supplied with the metal tags for their cars. On March 1 the total of non-employee members was 9,708. Complete classified figures covering the membership increase during the month of March have not yet been tabulated, but the results have been most gratifying as regards new non-employee members. The total for both employees and non-employees up to April 1 will exceed 26,000, most of the new members being persons not employed on this railroad.

In co-operation with the "Stop, Look and Listen" clubs safety committees have been organized in many communities, composed of leading citizens, which are actively working for the promotion of careful driving, obedience to traffic laws and rules of the road, courtesy of the road and thought for others' safety. The benefits of this are also readily to be perceived.

There should be a standard code of nation-wide, uniform traffic rules, wisely enacted and rigidly enforced. Every man, woman and child who operates a motor propelled vehicle should be subjected to an intelligent, courteous, conscientious examination by a competent non-political, non-fee-hunting board which would pass upon his or her qualifications as a driver without red tape or bumptious officiousness.

This paper was received without discussion.

Other Papers and Reports

L. H. Woodall, superintendent, Southern, prepared a paper on the killing of live stock in which he said that in 1920 the Southern paid out \$405,527.30 in claims for live stock killed on its right-of-way. The management organized a fencing department in 1921 which has built 384 miles of fence in 21 months at a cost of \$200,406.62. The reduction in claims paid for killing live stock at the end of 1923 was \$222,630.06. It cost the Southern railway \$200,406.62 to build 384 miles, which yielded a net saving of \$28,223.44, after paying for the building of the fence. In addition, this amount of live stock was saved for both food consumption and breeding purposes.

The Operation of Work Trains

An abstract of the report on The Economical Operation of Work Trains follows:

The economical operation of work trains demands the most efficient supervision on the part of division officers. In order to bring about the most economical handling, they should be regulated on the following basis:

1. The division roadmaster should be fully informed each morning as to the company material on hand, including the initials and numbers of cars, their contents and destination and a thorough understanding should be had between the roadmaster, supervisor, trainmaster and chief dispatcher as to the necessity of train service for handling.

2. At least 15 hours' notice should be given in advance of the time that the work train is desired.

3. All concerned, including the conductor, should be fully informed as to the character of material that this train is to handle, giving the point at which men will be picked up and the point where the work of loading or unloading is to start. This information should carry with it the manner in which the train must be built up.

4. The same interest should be given to dispatching a work train on time as is given to the dispatching of a first-class passenger train, as, in most cases, the time of many men is confined to this work train service, and if it is permitted to stand still at a terminal, or any other point, even if for only a few minutes, it results in a large loss in the aggregate.

5. It must be borne in mind that, while the money spent for work train service comes out of the general till, it is charged directly to maintenance of way; and, in order that a man in this branch of the service may maintain proper credit and reputation, he should see to it that he is efficiently served for the money charged for such service.

6. The superintendent and all other division officers should give the most hearty co-operation in seeing that efficient work train service is rendered.

The report was signed by W. W. Waits, chairman, superintendent, Sou., Atlanta, Ga.; W. H. Newell, general superintendent, A. C. L., Rocky Mount, N. C.; C. H. Baltzell, superintendent, St. L.-S. F., Sapulpa, Okla.; A. D. Caulfield, superintendent, I. C., Water Valley, Miss.; J. E. Agee, trainmaster, A. T. & S. F., Pueblo, Col.; W. C. Bevington, superintendent, M. P., Nevada, Mo.; N. A. Ryan, assistant superintendent, C. M. & St. P., Terre Haute, Ind.; and L. W. Berry, superintendent, N. Y. & L. B., Long Branch, N. J.

Interchange Between Mexico and U. S.

A special committee of officers of the National Railways of Mexico, of which Manuel Chavero, superintendent, National Railways of Mexico, Monterey, was chairman, submitted a report on the stimulation of interchange business between Mexico and the United States. A portion of the report follows:

We would like industrial, colonization and passenger men of the American lines to come to Mexico and develop their lines of effort, where unlimited opportunities are available. We believe that the work they might do in advertising would create much more confidence to those that might be interested in travel or development of their business much better than we could do ourselves. In this connection it is most gratifying that quite a number of your important roads, not only those forming our immediate connections, but some as far east as the Erie, have

already issued most impressive pamphlets featuring Mexico, and this good work should be encouraged among your respective roads as much as possible. A co-ordinate study should be made of the rates which will encourage the all-rail movement to and from Mexico.

From an operating standpoint, we are confronted with a few impediments which, if modified or corrected, would undoubtedly enhance commerce between the two countries. In this respect we speak of the American Government's restrictions relative to the cleaning and fumigation of all cars coming into the United States from Mexico; we refer to our being compelled to collect the charges for the American Government for the service performed, which we think should be carried on by the American lines. At one of our interchange points, we are compelled to assume switching charges to the fumigation plant, which adds an unnecessary expense to the shippers.

We feel that an immediate study should be made for the resumption of through billing and interline settlements, which service offers material advantage to shippers and consignees. We recommend the establishment of designated customs brokers to simplify customs, handling, economical and uniform charges and expeditious movement. We also recommend the adoption of uniform practice in the interchange of cars, that is, one line should do all the work of receiving and delivering cars.

This report was received without discussion.

Convention of Santa Fe Apprentice Instructors

THE ANNUAL CONVENTION of the apprentice instructors of the Santa Fe System was held at Albuquerque, N. M., May 19-22, the meetings being held at the Alvarado hotel. F. W. Thomas, supervisor of apprentices, who has had charge of this training system since its organization nearly 17 years ago, presided at the general sessions. Seventy-two apprentice instructors of the Santa Fe System were present, these coming from the various shops on the system, where the nearly 2,000 apprentices of the road are employed.

Santa Fe apprentice graduates who were former apprentice instructors on the Santa Fe, are now in charge of apprentice instruction on the El Paso & South Western, the Duluth & Iron Range, the Duluth, Missabe & Northern, the Kansas City Southern, the Missouri, Kansas & Texas, and the Los Angeles & Salt Lake. Four of these supervisors of apprentices, J. G. Savage, El Paso, Texas; G. T. Peterson, Two Harbors, Minn.; L. R. Linn, Proctor, Minn., and C. Y. Thomas, Pittsburg, Kansas, were present, and took part in the discussions, telling of the apprentice work on their railways and becoming familiar with methods of training adopted on the Santa Fe since they had gone out to carry on the good work in other fields. Letters from other supervisors of apprentices were read at the meeting.

The position of apprentice instructor on the Santa Fe has proved to be a stepping stone for further promotion. Men who can handle boys successfully and prove themselves leaders among boys are in general able to direct men. This quality, together with the experience gained as instructor, equips the instructors for foremanship positions. As evidence of this it is interesting to note that 18 of the instructors present at this convention, or 25 per cent of the total number, were new instructors who had been appointed since the instructors' convention at Galveston a year ago. The constant change in personnel of instructors is one of the reasons for holding these instructors' conventions each year, but so many ideas of value in the training of apprentices are brought out at each meeting that they would be worth while even though no changes had occurred in the personnel of the instructors.

Five graduates of the apprentice courses of this system, are now holding positions of division master mechanic on the

Santa Fe. Two of these were present and took active part in the discussions.

The address of welcome was made by D. E. Barton, superintendent of the Albuquerque shops. J. R. Sexton, mechanical superintendent, with headquarters at La Junta, Col., in his address complimented the instructors on the good work being done, pointed out the value of co-operation and urged each to assist every department of the service, stating that the loftiest of all aspirations is to serve and be helpful to others. He reminded the instructors that there is a greater joy in doing for others than for self, and stated that our greatest responsibility is not in providing for old age, but in training younger men who must fill our places, stronger shoulders to bear the responsibilities which are continually falling upon them and that this should be our greatest concern. He pointed out that the old theory that every man must learn by experience no longer applies, that the wise man is he who profits by the experience of others. He did not wish the apprentices to be permitted to make the same mistakes older men have committed nor to have to struggle in the same rough road as those who have gone before, and urged the instructors to take a personal interest in them, to win their confidence and respect, to set before them a worthy example, and to give them the best training possible. He told of the good work being done by apprentices on his district and by the apprentice graduates promoted to foremanships, saying no better proof of their efficient work could be cited than the lack of engine failures on the territory where they were employed.

J. R. Leverage, assistant superintendent of shops, Albuquerque, spoke on "Getting Closer to the Boys," emphasizing the importance of careful selection both of apprentices and of apprentice instructors, mentioning qualities essential in a good instructor, and pointing out the importance of co-operation, love, good fellowship, honesty and loyalty.

Chas. Raitt, assistant master mechanic, Prescott, Ariz., gave constructive criticism by pointing out shortcomings in some of the graduates working in his shops, saying even though such weaknesses did not apply to the majority of Santa Fe graduates they were sufficiently serious to merit the careful consideration of every instructor on the system.

H. B. Martz, of the Santa Fe System Foreman's Association, told of the work and aims of the Foreman's Association. Others spoke of the good work accomplished by the shop crafts associations and of the participation of the apprentices in meetings of these associations.

D. C. Davis, lubrication supervisor, spoke on Inspection and Repairs of Freight Cars, pointing out the qualifications of a good inspector and the opportunity the instructors had for assisting in this work by properly training the young men who would be the future inspectors and executives of the road. In answer to the question as to how to prevent hot box troubles, he replied that the only solution was to ascertain and remove the cause *before* rather than after trouble arises. Geo. Austin, general boiler inspector told of the high cost of boiler work and stressed the importance of teaching the apprentices to do their work accurately and correctly. He emphasized the importance of following instructions in the Santa Fe Locomotive Folio, the book showing standard practices on the Santa Fe. In the discussion as to the amount of time apprentices should be assigned to welding experience he stated that this should be determined by the apprentice's welding ability as shown by actual tests of test pieces of his work. The boiler shop apprentice instructors present were given the benefit of a separate session with Mr. Austin.

George H. Wood, supervisor of air brakes, spoke on Automatic Train Control, setting forth fundamental principles of its application and urging the instructors to become familiar with this subject before the control is adopted for their territory. E. H. McKernan, supervisor of tools, gave

figures on the cost and maintenance of tools, and by the concrete illustrations given impressed upon the instructors the importance of more thorough instruction as to the use and conservation of tools and the necessity of proper lubrication.

W. H. Evans of the Baldwin Locomotive Works showed two moving pictures, one the manufacture of steel tires by the Standard Steel Works Company, the other the assembling and erecting of a Santa Fe locomotive at the Baldwin Locomotive Works.

The major portion of the convention was devoted to discussions by the instructors themselves of subjects of specific interest to them in their work of instructing and training the apprentices. Among the subjects discussed were the following: "Apprentice Activities, Clubs, Craft Associations, etc." "Care of Trades Having Few Apprentices," "Apprentice Board Meetings," "Handling Boys of Deficient Education," "Following Shop Schedules," "Methods of Instruction," "School Room Schedules," "Proposed Legislation Affecting Vocational Education," and "Jigs, Labor-saving Devices, etc.," the latter being accompanied by a very elaborate exhibit of devices gotten up by instructors. In appreciation of the efficient work of J. R. Phelps, San Bernardino, Cal., chairman of the Committee on Jigs and Labor Saving Devices, arrangements were made to send him to the convention at Atlantic City as a representative of the apprentice department.

Mr. Thomas closed the meeting with an address impressing upon the instructors the importance of their work and urging them to accept whatever promotion is offered, even though the nature of the work and the location may not be so attractive as that of their present position, reminding them that often the least attractive positions offer the best experience to fit them for further promotion.

The instructors were given an opportunity to visit the various departments of the new Albuquerque shops, the most modern and up-to-date railway shops west of the Mississippi. They also profited much by the opportunity of mingling with each other, not only at the meetings but also on the train enroute to and from the convention, for going in special cars they had a splendid opportunity of talking shop, comparing notes and getting practical help from others engaged in the same kind of work as themselves.

The convention as a whole was pronounced to be the best of its kind ever held, each instructor returning to his home station better equipped and with renewed determination to make of the apprentices in his charge the very best mechanics possible.

While Mr. Thomas requires all instructors to attend each session of the convention, and often the sessions are long, he realizes the stimulating effect of play and sees that ample entertainment is provided for the late afternoon and evening hours. This year's entertainment included a picnic supper in Tijeras Canyon by the D. E. B. Apprentice Club of Albuquerque, a dance in the ball room of the Alvarado Hotel, a luncheon for the ladies at the Albuquerque Country Club, and an automobile ride over the scenic highway through Tijeras Canyon to the top of Sandia Mountain.

THE PENNSYLVANIA RAILROAD reports that strawberries from Florida and North Carolina, moving north through Potomac Yard, Va., this season, have amounted to 2,468 carloads; and only nine cars arrived at destination behind time. The movement of produce from the Maryland-Delaware-Virginia Peninsula this year has been the heaviest on record and the company expects soon to have finished the movement of 3,500 carloads of strawberries from this territory. This crop has matured irregularly, because of varying conditions of weather, but the car supply has been kept up and substantially every car of berries has reached destination on time. Half of this freight was destined to Jersey City.

Michigan Central Breaks Previous Records

New Figures Set Up in 1923 for Revenue Tons, Freight Revenue, Total Operating Revenues and Net Income

THE MICHIGAN CENTRAL fared so well in 1923 that it was able to break four previous records of performance. The revenue tonnage for the year exceeded that of the best previous year, which was 1920, by 7.02 per cent. Freight revenues exceeded those of 1922, the best previous year in this respect, by no less than 15.11 per cent. The best previous figure of total operating revenues was that of 1920, which was exceeded in 1923 by 7.98 per cent. Finally, and most important of the four, was the figure of net corporate income, which was so good as to exceed that of 1922 by 10.59

1923 to no less than 241 per cent. It is a fair question whether there is any other road in the country which can show a similar expansion of net earnings in this same period of years.

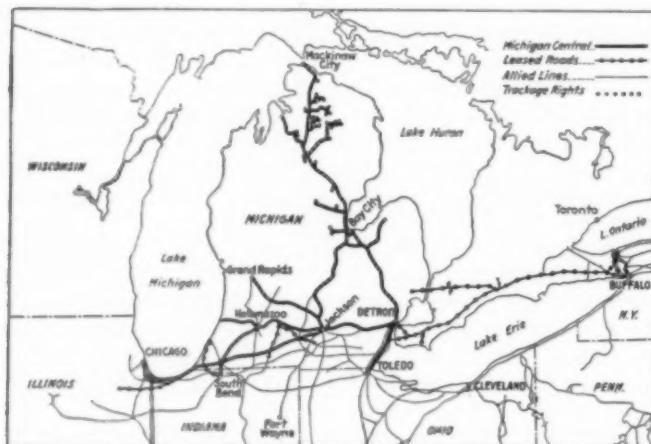
In 1923, net corporate income, or net after interest and other charges, was \$14,176,448 which compared with \$12,818,271 in 1922 and with \$7,725,337 in 1921. With the exception of 1922 the corporate net of 1923 was in excess of the net for any other two previous years in Michigan Central history.

The Michigan Central now pays 20 per cent dividends, the rate of 20 per cent having been established in the early part of 1923. The 20 per cent disbursement in 1923 totaled \$3,747,280 and it is interesting to observe that the surplus carried to profit and loss after these dividends was no less than \$10,429,168 and that the dividends, although at the 20 per cent rate, were earned more than three and one-half times over. Of course, a statement of this sort requires certain qualifications. The capital stock of the Michigan Central totals only \$18,736,400 out of the total capitalization of \$94,097,708. This is a case of high dividend rate on a comparatively small amount of stock. In fact, the dividends in 1923 exceeded the interest on funded debt by only about \$500,000 in spite of the fact that the funded debt is over four times the capital stock.

Recapture

On the other hand, there is the matter of recapture. It may develop that a considerable portion of the \$10,000,000 surplus after dividends in 1923 may be taken from the road under the provisions of Section 15a. The Interstate Commerce Commission, which has been dealing with this matter in a somewhat tentative manner, made an estimate the other day that the excess of net railway operating income over 6 per cent on the property investment in the case of the Michigan Central in 1923 amounted to \$9,994,049 and in 1922 to \$8,671,983. Of course, these figures at the present time do not mean a great deal because the valuation is far from completion and it may prove to be the case that the figure of \$9,994,049 for 1923 will be found too great. As things stand at present, however, it might appear that the Michigan Central will be called upon to return to the government because of the recapture clause a sum equivalent to not quite \$5,000,000. Even if this does prove to be the amount of recapture, and it is very much of a question whether it will, the Michigan Central, on the basis of its 1923 earnings will be able to carry to profit and loss over \$5,000,000 after dividends and after recapture. Dividends, recapture notwithstanding, will have been earned approximately two and one-half times over.

Although the Michigan Central's revenue tons, freight revenues, total operating revenues and net income in 1923 broke all previous records, this was not the case with revenue



The Michigan Central

per cent and to be nearly double the net for 1921, in which year there had been reported the best net after charges for any year up to that time.

Remarkable Increase in Net Income

The Michigan Central has in recent years had a truly remarkable spurt of prosperity, both from the standpoint of net from operations and net after fixed charges. The improvement in net from operations is best shown by certain comparisons with the standard return for operations during the period of federal control or with the average annual net operating income for the three years ended June 30, 1917. The Michigan Central standard return was \$8,052,127. In 1918, the first year of federal control, the property earned the standard return more than one and one-half times and during 1919, when it was the exception for any road to earn even the standard return, the Michigan Central earned it more than twice. Net railway operating income for the Michigan Central in 1923 was \$19,388,175. In 1922, with considerably less traffic, there is a net operating income of \$18,066,109. In other words, the net operating income of 1922 was equivalent to no less than 225 per cent of the standard return and that of

MICHIGAN CENTRAL OPERATING RESULTS, SELECTED ITEMS, 1914 TO 1923

Year ended Dec. 31	Mileage	Revenue tons	Revenue ton-miles	Average haul	Revenue per ton-mile, cents	Revenue train load	Revenue car load	Total operating revenues	Total operating expenses	Net operating revenue	Operating ratio	Net after charges
1914	1,800	19,196,012	3,066,954,000	160	0.675	462	16.67	\$33,464,968	\$25,181,484	\$8,283,484	75.25	\$414,419
1915	1,803	20,103,493	3,146,631,000	157	0.733	506	16.88	36,540,665	25,727,487	10,813,178	70.41	2,926,957
1916	1,862	24,947,892	4,172,557,000	167	0.714	580	18.27	46,418,790	30,646,261	15,772,529	66.02	6,837,436
1917	1,862	27,240,892	4,669,331,000	171	0.726	655	20.39	52,879,434	38,289,136	14,590,298	72.41	3,438,216
1918	1,862	29,653,126	5,203,158,000	175	0.883	698	22.39	68,520,087	51,070,072	17,450,015	74.53	547,858
1919	1,862	26,578,110	4,718,764,000	178	1.095	736	21.42	78,844,386	57,841,814	21,002,572	73.36	67,229
1920	1,866	30,203,776	4,824,740,000	160	1.144	761	24.20	87,790,799	77,140,559	10,650,240	87.87	3,805,785
1921	1,862	20,471,263	3,127,686,000	153	1.462	609	20.09	72,911,852	52,551,945	20,359,908	72.08	7,725,337
1922	1,862	25,261,826	3,852,216,000	152	1.446	604	18.86	83,426,407	59,576,357	23,850,050	71.41	12,818,271
1923	1,863	32,323,248	4,863,930,000	150	1.319	667	20.98	94,798,042	67,639,532	27,158,510	71.35	14,176,448

ton-miles. On the traffic handled in 1923 the Michigan Central reported an average haul of only 150 miles, which was the shortest average haul that it had reported on its traffic for an extended period of years. Thus it results that, although the revenue tons of 1923 exceeded those of the best previous year, 1920, by 7.02 per cent, revenue ton-miles were not as great as in 1918, in which year there was an average haul of 175 miles. Revenue ton miles, nevertheless, were in excess of those of 1920 and greater than those of any other year except 1918. Passenger revenues similarly did not break the previous record. They were greater than in any previous year except 1920 but 8.88 per cent less than in that year.

1923 Revenues and Expenses

Total operating revenues in 1923 were \$94,798,042, an increase of \$11,371,635 or 13.63 per cent over 1922. It has already been noted that freight revenue was 15.11 per cent in excess of that of 1922. Tons of revenue freight totaled 32,323,248, an increase over 1922 of 27.95 per cent. Revenue ton-miles exceeded those of 1922 by 26 per cent. The reason for the much greater increase in tonnage than in freight revenue is accounted for in the 1923 annual report by the fact that a large share of the increased traffic was in the low grade commodities. As a matter of fact, of the total increase in tonnage, over half was in anthracite and bituminous coal, the traffic in which, in 1922, was reduced, of course, by the coal strike. The annual report does not mention it but another reason must have been reductions in freight rates which occurred on July 1, 1922 and which, therefore, applied on only part of the 1922 traffic but on all of that carried in 1923.

Total operating expenses in 1923 amounted to \$67,639,532, an increase of \$8,063,175 or 13.5 per cent. There was an increase of 27 per cent in expenses for maintenance of way and structures, explained as being due to the heavier traffic handled, which resulted in a more extensive program of rail and ballast renewals and tie spacing and as being due in part to wage increases. Expenses for maintenance of equipment increased 11.5 per cent, which increase was much below the average for the country which was 17.1 per cent. This is explained by the fact that Michigan Central power was in good shape in 1922 and by the fact also that because the New York Central lines settled with their shop strikers this favorable condition was not lost. Transportation expenses increased also 11.5 per cent over 1922, which increase does not seem out of line with the increase of 26 per cent in revenue ton-miles. The road was favored, however, by the reduced cost of fuel. In spite of the heavy traffic the total cost of fuel was actually less in 1923 than in 1922. There was a marked reduction in payments for loss and damage, amounting, in spite of the increased traffic, to no less than about 43 per cent. The operating ratio of 1923 was 71.35 per cent and the ratio of transportation expenses to railway operating revenues was 33.99 per cent, either of which figures shows that the Michigan Central is well favored.

Capital Improvements

In common with the other New York Central Lines, the Michigan Central carried out in 1923 a heavy program of additions and betterments. The total expenditure for additions and betterments amounted to \$19,557,394 of which \$4,390,069 was for road and \$15,167,325 was for equipment. These figures, particularly with reference to equipment, are so large as to be hardly comparable with previous years. As a matter of fact, the net increase in road and equipment during the year exceeded the total for the three years immediately preceding. To take care of the rapidly expanding industrial growth of its territory, the Michigan Central has had to effect extensive increases to its plant. The increase in the amount of equipment owned in recent years has been particularly great. At the end of 1923 the road had 777 locomotives in service whereas at the end of 1915 the number

was 740. The freight cars in service at the end of 1923 totaled 34,909; at the end of 1915 the number of cars in service was 24,432. It is of interest that notwithstanding this marked increase in equipment, the Michigan Central had a debit equipment rental balance in 1923 of \$1,619,002. In 1916, however, which also was a year of heavy traffic, the debit equipment rental balance was \$2,274,352.

Earnings for First Four Months of 1924

The Michigan Central is not doing quite as well so far this year as it did during the comparable period of last year. The latest figures available at this writing—those for April and the first four months—show gross income for the first four months of 1924 of \$30,427,163 as compared with \$31,590,552 for the first four months of 1923. Net railway operating income of \$6,601,762 for the period from January 1 to April 30, 1924, compared with \$7,102,826 for the same period last year.

The Mining and Inspection of Locomotive Coal*

By Malcolm Macfarlane

General Fuel Inspector, New York Central Lines

THE FIRST METHOD used to obtain coal by the pioneers of the coal industry was by means of the hand pick, and for many years this was the only method employed. Excellent results were obtained by this system, as the individual miners of yesterday felt their responsibility and took pride in producing clean coal. Not only did they undermine by hand, but side sheared and wedged the coal from the roof. The latter was done by driving in wedges horizontally along the top to bring the coal down, instead of using powder. This produced coal of a lumpy or coarse nature, and when slate bands, bony coal, or other impurities appeared in the seam, these were more easily removed from the large lumps than they could have been if powder were used to blast the coal, which mixes the impurities with the coal.

As the coal trade broadened and consumption increased, greater tonnage was demanded, which required an increased output from the mines. Inasmuch as coal produced by manual labor was necessarily limited in quantity, another method of mining had to be devised, and this led to the use of the coal cutting machine.

Mining machine operation requires careful supervision and strict attention in order to guard against the possibility of cutting into the pavement. When extraneous material is penetrated by the machine, it is practically impossible to remove it owing to its pulverized, granulated or small nature, and its becoming thoroughly mixed with the coal.

After the coal in the seam is undercut, the coal is ready to be shot down. This phase of coal mining is the most important, and deserves serious consideration in connection with the production of coal for locomotive fuel. The question of the amount and kind of powder to be used in blasting coal, of course, depends entirely on local conditions in the mine, and on the nature of the coal, whether it be of a soft or hard texture. Some coals require a smaller charge than others in shooting so as to reduce the percentage of slack and avoid the excessive mixture of slate and other impurities in the seam with the coal. Particularly is it true that too much explosive used on coals of a soft or friable nature naturally shatters both the coal and the binders of slate or horn, thereby producing a highly pulverized or slack coal containing impurities that cannot be removed. Coal of a lumpy nature is best adaptable for locomotive fuel, and therefore, too much em-

*Abstract of a Paper Presented at Annual Convention of the International Railway Fuel Association.

phasis cannot be placed on the proper use of explosives so as to obtain the maximum of lump and the lowest percentage of slack coal.

The railroads of the United States and Canada consume annually approximately 150,000,000 tons of coal—a tremendous figure—and when we consider the cost in dollars and cents that approximately \$500,000,000 is spent each year on our railroad fuel bill, the importance of clean coal for railroad fuel cannot be overestimated. Assuming that each ton of purchased coal contains only 10 lb. of foreign or non-combustible substance (and that is not by any means a liberal allowance), it will be readily observed that in the annual tonnage of coal purchased by the railroads there are about 750,000 tons, or 15,000 50-ton railroad cars, or 200 average trainloads of useless material! Not only useless, but expensive as well, as it necessitates utilizing railroad equipment and requires coal consumption in transportation.

Primarily, the most important place for the removal of impurities is inside the mine, at the working face, whether it be in the headings, rooms, or during the extraction of coal from pillars. This requires strict attention to every detail, and more especially today inasmuch as some of the best seams of coal, which contained few impurities, have been exhausted. Practically every known seam of coal operated today contains some impurities which must be removed. These are in the form of slate bands, blue bands, bony coal, horn, fire-clay and iron pyrites or sulphur balls. In addition to these, we sometimes encounter roof and pavement conditions where this extraneous material must be carefully watched and eliminated from the coal.

When slate, heavy sulphur or bony coal appear in the seam, these mix with the coal after the shot is completed. From actual practical experience in mining and loading coal, I know that these impurities can be detected by their weight on the shovel and can be removed from the coal. The smaller particles are more difficult to remove, however, and the resultant size of these is no doubt frequently due to an over-charge of explosive by miners. The production of clean coal is not such a difficult job if miners undertake their responsibility in a serious manner. These men have a constant view of the seam before them and know the impurities that it contains.

The bituminous coal miners have been content in the past to ship coal just as it came from the mine; that is, as run-of-mine coal, without, in most cases, even removing the bone and slate. Today, however, coal operators with broad vision are looking to the future and toward a marked improvement with the purpose in view of producing properly prepared coal, and to this end many of them have expended large sums of money on modern tipples. These are equipped with conveyors, picking tables, screens and loading booms for the purpose of furnishing clean coal and to eliminate breakage. The most effective picking table is the corrugated apron conveyor on which the coal is carried along slowly past the pickers, who are stationed on both sides, so that the refuse can be easily removed. In order to insure effective picking, it is necessary to remove the slack and small coal, so that it will not cover up or hide the refuse. On this account the coal is usually first screened into several sizes, and the different sizes carried by separate picking tables so that they can be picked separately.

Another important feature of the preparation of coal for locomotive use is the proper mixing of machine slack in run-of-mine coal. Whenever possible, this should be done inside the mine as coal is loaded into mine cars. If this is not feasible (owing to mining laws) an arrangement should be made on the outside whereby two cars of machine slack should never be dumped consecutively, but each car of machine slack should be followed by a car, or preferably several cars, of regular run-of-mine coal, thus insuring a proper mixture. The importance of this cannot be pointed

out too often in the proper preparation of coal for railroad fuel, in order to eliminate the possibility of locomotive tanks receiving an excessive amount of slack or fine coal at coaling stations.

In general, contracts for railroad fuel require that the coal to be furnished shall be subject to inspection by the buyer's inspectors. Therefore, prior to the letting of contracts, the first duty of the fuel inspector is to make an initial examination of the mines from which the coal operators propose to furnish coal. This initial or primary inspection should cover both the inside and outside of the mine, so that the inspector may obtain a view of the coal in the solid and note all impurities, and record a cross-section of the seam showing these impurities and their location in the seam. The inspector should also be required to take samples of the coal, from the roof to the pavement, and forward them to the laboratory for analysis. In addition, during the initial inspection of the mine, the inspector should obtain information on the following salient points, viz.: Geological name of seam, chart of seam, kind of tippie, kind of screens with screening area in square feet, whether or not there is a picking table, number of men employed on picking table, grades of coal possible to load, percentage of 1¼-in. screenings, grade of coal containing least impurities, whether present preparation of the coal is suitable for engine use, etc., etc. This information should be entered on a form provided for that purpose and sent by the inspector to his superiors as a matter of permanent record for future reference.

As soon as contracts are entered into, inspectors should be instructed to keep in constant touch with the operations from which the coal is obtained, and required to make daily mine inspection reports. These daily reports should be on a form so arranged as to convey to the inspector's superiors important information bearing on the production and shipment of fuel coal from the mine, as well as contain the opinion of the inspector as to what should be done at the mine to improve the quality or preparation of the coal should any improvement be deemed necessary, and also what suggestions along this line were made to the operator or mine officials by the inspector.

Inspectors should be given authority to reject any coal at the mines that in their opinions is not up to the standard required by contracts or that contains an excessive amount of impurities or slack, as well as any that shows laxity in preparation or loading. In cases where rejections are found continually necessary, as a final resort, on recommendations of inspectors, embargoes should be placed on mines, and these embargoes kept in force until such time as the inspectors advise their superiors that improvement has been made in the preparation of the coal to such an extent as to warrant lifting the embargo.

It should also be the duty of inspectors while traveling to or returning from collieries to stop at assembling yards or terminals for the purpose of making inspections of fuel in transit, particularly such fuel as has been loaded and shipped from one mine during the absence of the inspector on visits to other mines. This is another means of protecting the operating department of the railroad from receiving an inferior grade of fuel for locomotives. When an inspector discovers coal at these points that is not up to the required standard, he should have authority to reject it on the spot, and the shipper should be required to furnish reconsignment.

Lastly, I might add that it should be the duty of inspectors at all times to insist upon it that before equipment is loaded with coal at mine tipples, all foreign substances, such as wood, both small and large pieces, bolts, nuts, or any other extraneous matter, be removed from railroad cars as well as mine cars; this in order to eliminate the possibility of failures on stoker equipped locomotives; for we all know the effect of that small nut or bolt when it is carried into the conveyor with the fuel.

Milwaukee Earns Charges With Narrow Margin

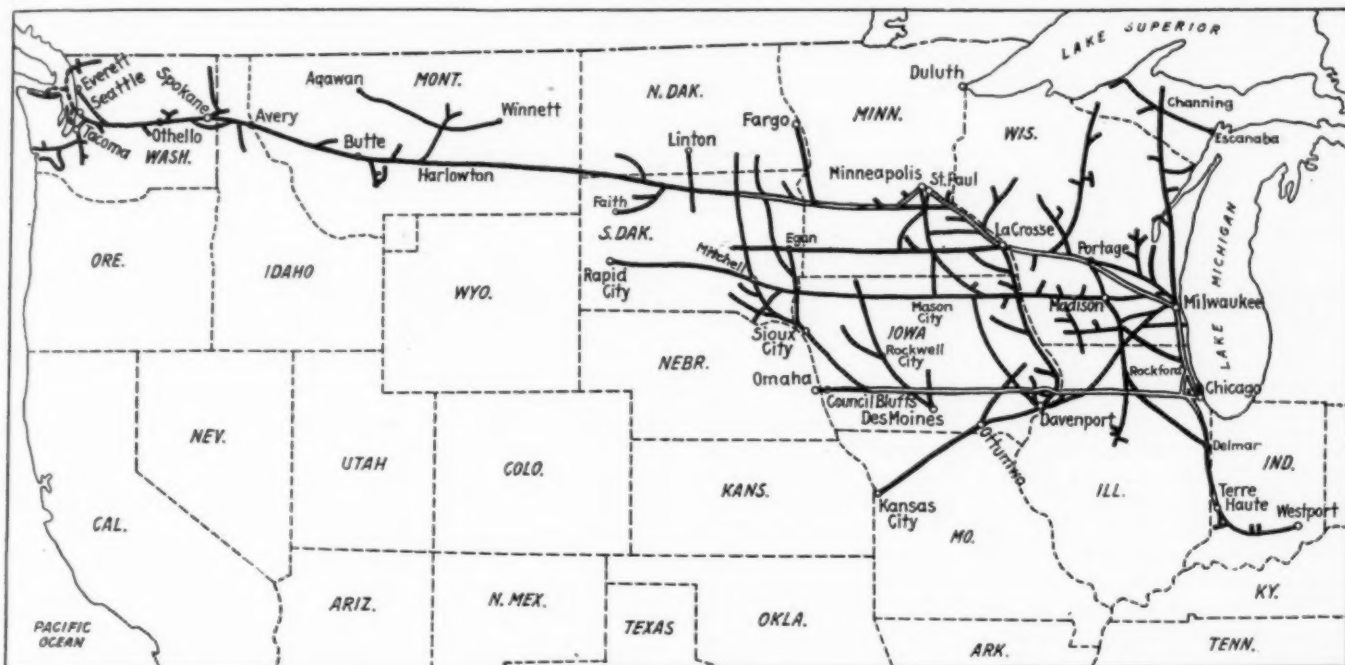
Had Deficit in 1922—Heavy Traffic Helped Towards Net in 1923—Is Making Poor Start for 1924

THE CHICAGO, MILWAUKEE & ST. PAUL did very much better in 1923 than it did in 1922. It did not, however, come through the year as well as earnings in the early part of 1923 gave promise that it might. The accomplishment of 1923, such as it was, consisted of changing a deficit after fixed charges of \$6,143,168 in 1922 to a net in 1923 of \$207,686. In 1921, the Milwaukee had a deficit after charges of \$11,070,609.

The principal reason for the Milwaukee's improvement in 1923 as compared with the two preceding years was its heavy traffic combined with substantial savings in costs. Revenue tons of freight carried exceeded those of 1922 by

year was 1918, in which year revenue ton-miles totaled 11,504,000,000. The influence on the figures of the inclusion of the Chicago, Terre Haute & Southeastern is reflected in the figures of traffic density. Average miles of line operated in 1923 were 10,011; but in 1918 only 10,303. The traffic density in 1923 was 1,085,758 revenue ton-miles per mile of line; in 1918, it was 1,116,597.

The total operating revenues of the Milwaukee were, like the revenue tons and revenue ton-miles, the greatest in the company's history. They totaled in 1923, \$169,628,338 as compared with \$156,950,628 in 1922. This was an increase of 8 per cent. Freight revenues increased 10 per cent but



The Chicago, Milwaukee & St. Paul

22 per cent, and revenue ton-miles by 12.5 per cent. To handle the 12.5 per cent increase in ton-miles there was an increase in operating expenses of but 4 per cent and in transportation expenses of but 0.48 per cent. There was marked reduction, particularly, in costs of locomotive fuel.

Heavy Traffic

The 1923 traffic was, in fact, the heaviest ever carried by the Milwaukee. This circumstance is, of course, partly due—particularly insofar as concerns comparison with years prior to 1921—to the inclusion in the system of the Chicago, Terre Haute & Southeastern. That property was acquired on July 1, 1921. The revenue tons of freight carried in 1923 totaled 51,314,300 and exceeded those of any previous year by a wide margin. They compared with 42,034,285 in 1922; with 45,041,277 in 1920 or with 40,307,047 in 1918. The average haul, however, was very short. It was but 232 miles, whereas in 1922 it was 252 miles, in 1920, 253 miles and in 1918 no less than 285 miles. The revenue tons carried were so great that even with the decreased length of haul, the revenue ton-miles exceeded those of any previous year. The revenue ton-miles totaled 11,922,000,000. The best previous

there was a decrease in passenger train revenues. The Milwaukee suffers in common with the other roads in the north-western region from its low rate level. The revenue per ton per mile in 1923 was 1.073 cents. In 1914, the Milwaukee revenue per ton per mile was 0.808 cents. The 1923 figure exceeded that of the fiscal year ended June 30, 1914, by but 33 per cent whereas the average increase in the ton-mile rate for all the roads in the country in 1923 as compared with 1914 was 54½ per cent. It is not difficult to see that an increase of 33 per cent in ton-mile revenues since 1914 is a very small weapon, indeed, with which to combat modern increased costs.

Operating Costs Held Down

Total operating expenses in 1923 totaled \$134,999,228. They compared with \$129,596,696 in 1922 and represented an increase over 1922 of only 4 per cent. The increase in operating expenses as between the two years amounted to \$5,402,531. There was an increase of \$3,265,228 or 14.2 per cent in expenses for maintenance of way and structures. The increase in expenses for maintenance of equipment was \$1,387,789 or but 3.6 per cent. This small increase followed

because the Milwaukee was one of the roads that settled with its railway shopmen in 1922 under the Willard-Warfield agreement. It did not, therefore, have as severe a problem as many roads with respect to the necessity for making up deferred equipment repair work in 1923. Nevertheless, it did have heavy costs for steam locomotive repairs, charges to which primary account in 1923 were \$1,729,069 or 14 per cent greater than in 1922. Some roads, it will be remembered, had much greater increases in this account, in some cases as high as 30 or even 50 per cent. Charges to the primary account of freight car repairs showed a marked decrease in 1923 as compared with 1922. This decrease amounted to \$2,669,908 or 11 per cent. In 1923, there was \$1,917,420 charged to freight train cars, retirements; an unusually large amount.

The really spectacular feature about the relatively small increase in operating expenses is to be found in the transportation account. Transportation expenses in 1923 totaled \$66,545,638. This figure compared with \$66,068,029 in 1922. There was thus an increase of but \$477,610, or but 0.48 per cent. The reason that the Milwaukee could move 12.5 per cent more revenue ton-miles with an increase of but

guarantee a net return on the money invested, etc. It is also true that the Milwaukee has spent in the past few years very large sums for new equipment, all of which has been financed with equipment trusts. In 1921, the Chicago, Terre Haute & Southeastern and on January 1, 1922, the Chicago, Milwaukee & Gary were acquired, which further added to the system's responsibilities.

These various developments have made the Milwaukee system a larger and better property. Presumably they have, on the whole, enabled it to meet the needs of the enlarged territory which it now serves with greater efficiency. The qualifying word "presumably" is necessary in this connection, of course, because, for instance, if the money had not been spent for double-tracking or for electrification it might have been spent for something else that might have been of equal or greater value to the system's welfare. On the other hand, if the money had not been spent in the quantity that it was spent, probably the company would not now be as handicapped as it is financially.

Of course, the point is that the Milwaukee has been built for the needs of the future. It has not thus far been able to realize on its vast program of expansion. Traffic has not

CHICAGO, MILWAUKEE & ST. PAUL OPERATING RESULTS, SELECTED ITEMS, 1914 TO 1923

Year ended June 30	Mileage	Revenue tons	Revenue ton-miles	Ton-miles per mile of line	Average haul	Rev. train load	Rev. car load	Rev. per ton-mile cents	Total operating revenues	Total operating expenses	Net operating revenue	Corporate net income
1914	9,684	33,007,277	8,079,690,000	834,334	245	380	16.50	0.808	93,613,700	62,890,301	30,723,399	15,476,286
1915	10,053	32,959,392	8,185,988,000	814,283	248	390	16.83	0.781	91,435,374	61,971,701	29,463,673	11,968,282
1916	10,130	38,313,345	10,043,236,000	991,435	262	425	17.94	0.757	105,646,484	69,120,958	36,525,526	16,717,357
Year ended Dec. 31												
1916	10,196	39,986,136	10,747,323,000	1,054,072	269	442	18.15	0.741	110,609,689	73,765,051	36,844,638	16,068,260
1917	10,257	38,444,353	10,545,443,000	1,028,122	274	468	20.06	0.758	113,739,202	85,195,964	28,543,238	4,468,632
1918	10,303	40,307,047	11,504,301,000	1,116,597	285	536	22.89	0.840	132,894,455	122,196,105	10,698,350	6,241,510
1919	10,647	40,295,220	11,501,514,000	1,080,259	285	554	21.97	0.924	150,370,394	138,561,705	11,808,689	7,643,045
1920	10,624	45,041,277	11,384,601,000	1,071,593	253	544	22.38	1.029	168,158,734	164,697,121	3,461,613	4,366,071
1921	10,809	34,067,136	8,283,212,000	766,325	243	483	21.27	1.266	146,765,766	127,957,002	18,808,764	11,070,609
1922	11,030	42,034,285	10,601,914,000	961,189	252	543	22.18	1.094	156,950,628	129,596,696	27,353,932	6,143,168
1923	11,011	51,314,300	11,922,244,000	1,082,758	232	551	21.96	1.073	169,628,338	134,999,228	34,629,110	207,686

0.48 per cent in transportation expenses as compared with the previous year is principally explained by the marked reduction in cost of fuel. There was charged to the primary account of fuel for train locomotives in 1923, \$10,848,879. This compared with \$13,237,248 in 1922. In other words, there was a decrease of \$2,388,369 or no less than 18 per cent. Part of this decrease was due to the fact that the coal strike of 1922 exaggerated costs of coal during that year. More significance is given to the 1923 reduction of fuel costs, therefore, by a comparison with 1921. The cost of fuel for train locomotives in 1921 was \$11,942,776. The traffic handled by the Milwaukee in 1921 was abnormally low—but 8,283,000,000 revenue ton-miles. Thus, it results that although the Milwaukee handled in 1923, 44 per cent more traffic than in 1921, its cost for fuel for train locomotives was actually 9 per cent less than in 1921.

This improved fuel situation is attributed in the Milwaukee annual report for 1923 to advantages derived from the acquisition of the Chicago, Terre Haute & Southeastern from which territory the major portion of the fuel supply is now procured.

Milwaukee Difficulties

Much consideration has been given in these columns over a period of years to the difficulties that have worked to the end that the Milwaukee is now considered to have done well to earn its fixed charges whereas not more than ten years it used to have net after charges of \$10,000,000 to \$16,000,000. The familiar factors are the extension of the Milwaukee system to the Pacific coast; the double-tracking of this line as far as Aberdeen, S. Dak., and of most of the line from Chicago to Omaha, prior in the minds of many observers to really urgent necessity for this expensive improvement; electrification of some 660 miles of the Puget Sound line, also prior to that time when sufficient traffic was available to

been forthcoming in expected volume. Just at this moment in particular, there is depression in the Northwest. The situation as to Panama Canal competition and the rate relationships as to Intermountain and Pacific coast business are handicaps. The handicap is a two-fold one—traffic and operating. The operating handicap results, because of the total revenue traffic handled by the Milwaukee, about one-fifth is products of forests. The cars move eastbound loaded with lumber, but under present conditions must move westbound empty. The Milwaukee suffers like the other northwestern carriers because of its comparatively low rate level which, as already remarked, is entirely out of line with the increased costs that have ensued since the war. It is the general opinion that as time goes on the Milwaukee will realize more and more on the developments that it has effected. The trouble is that the going will be hard until conditions have caught up with the program of expansion.

Chicago, Terre Haute & Southeastern Coal

The background should give one a more adequate realization of the importance of the remarkable saving in fuel costs that the Milwaukee reports for 1923. If nothing more it is at least an indication of the value that the latest step in the development program—the acquisition of the Chicago, Terre Haute & Southeastern—is going to prove to the system. This property has given the Milwaukee, first of all, a much better position with reference to coal traffic to the territory west and northwest of Chicago, as far west presumably as Aberdeen. Coal tonnage handled in 1923 totaled \$9,568,886 and it was 18.7 per cent of the total revenue tonnage handled. In 1918, to take a good typical year in the fairly recent past, the coal tonnage was 6,297,184 which was 15.62 per cent of the total tonnage for that year. The point is not the increase, however, so much as the fact that gradually a larger and larger proportion of the coal tonnage moved into the

Milwaukee territory will be coal that originates on its own lines and on which it does not have to make division of the revenue with some other originating carrier. The development of the coal traffic of the C., T. H. & S. E. must, indeed, offer an interesting merchandising problem for the Milwaukee traffic department. C., T. H. & S. E. coal, prior to the time that the property was taken over by the Milwaukee, moved mainly to Chicago and distribution to distant territory was limited. Under the new relationship, the attempt has been made to sell the coal in Milwaukee territory with resulting benefit to the coal operator and to the railroad alike. The saving in fuel costs is another factor of great if not greater importance to the railroad which now has the great advantage of securing the better part of its fuel supply on its own lines.

Changed Conditions Since 1916

The Milwaukee operating ratio in 1923 was 79.6 per cent. That in 1922 was 82.7. In 1923, the ratio of transportation expenses to total operating revenues was 40, which, of course, was high. The net operating revenue—total revenues less expenses—was \$34,629,110. This compared with \$27,353,932 in 1922. It was the highest figure ever reported in Milwaukee history with the exception of the net operating revenue for the fiscal year ended June 30, 1916, and the calendar year December 31, 1916, in both of which periods the figure was over 36½ million. In 1923, there was a net after charges of only \$207,686. In 1916, for the fiscal year

there was net after charges of over \$16,000,000 and the company paid 7 per cent on its preferred stock and 4½ per cent on its common, these dividends totaling \$13,391,478. The change in the situation in the years intervening between 1916 and 1923 is not far to seek. It lies principally in three items; increased taxes, increased interest charges and increased rentals for equipment. In the fiscal year ended June 30, 1916, taxes totaled \$5,264,331; in 1923, \$8,614,180. Interest charges in the earlier year totaled \$15,604,262; in 1923, interest was paid amounting to \$19,443,503 on funded debt and to an additional \$586,161 on unfunded debt. In spite of its large acquisition of equipment in recent years, the Milwaukee still is confronted with a heavy debit per diem balance. There was a net debit for equipment rents in the year ended June 30, 1916, of but \$908,132. In 1923 the debit balance totaled no less than \$4,400,584.

Deficit in April, 1924

The Milwaukee is not starting 1924 as well as it started 1923. Gross revenues for the first four months of this year totaled \$50,153,218 as compared with \$55,720,572 in the same period of 1923, a reduction of \$5,567,354. Net operating income of \$2,775,629 for the first four months of 1924 compared with \$5,038,759 for the same period of last year, a reduction of \$2,263,130. For the month of April, there was a net operating deficit after equipment and joint facility rents of \$691,857, comparing with net in April last year of \$1,066,294.

C. of N. J. Locomotive Repair Contracts Criticized

I. C. C. Reports on Investigation of Repair Contracts in 1920 and 1921—Three Commissioners Dissent

WASHINGTON, D. C.

THE INTERSTATE COMMERCE COMMISSION on June 24 made public its report on its investigation of the outside locomotive repair contracts made by the Central of New Jersey in 1920 and 1921, in which a majority of the commissioners find that the cost of classified repairs given to 115 locomotives by the Baldwin Locomotive Works and the American Locomotive Company "was greatly in excess of the cost of similar work in respondent's own shops, and that, even though at the end of federal control some assistance to respondent's shops may have been necessary or expedient as an emergency, the contract work was carried beyond the reasonable necessities and a large part of the excess expenditures could have been avoided; also that those expenditures would at least have gone far to provide respondent with much-needed additional shop facilities."

Commissioner Potter filed a dissenting opinion taking the position that while mistakes may have been made there is nothing indicating that it was made in disregard of proper management requirements. Commissioners Hall and Cox also dissented. Commissioner McManamy did not vote because of having been a witness in this case while with the Railroad Administration. An almost complete abstract of the report follows:

As in the instances of other carriers in the course of this investigation, the hearing was preceded by an examination of respondent's shop and other records, together with pertinent records of the United States Railroad Administration and of this commission, and the data gathered therefrom have been introduced in evidence. This examination was made by one of our locomotive inspectors and one of our examiners of accounts, hereinafter called the investigators. Their evidence is supplemented by evidence submitted by representatives of the Railroad Administration and by the intervener. Opposing evidence has been submitted in respondent's behalf.

In all, 115 of respondent's locomotives were repaired by the two construction companies first above mentioned. Of this number, 57 were sent in 1920 and 30 in 1921 to the Baldwin plant, and 3 in 1920 and 25 in 1921 to the American. The investigators ended their field work August 26, 1921, and their report covers 90 of the locomotives, including 15 sent to each of the two plants in 1921. No written contract was entered into with the American plant in 1920, and the 3 sent in that year were paid for in a lump sum upon bill rendered. The first 15 of the total number sent to that plant in 1921 were covered by three contracts, for 5 locomotives each and at flat prices per locomotive based upon inspections, executed May 20, June 28, and August 26, 1921. A further similar contract for 10 additional locomotives was entered into with that company September 16, 1921. A contract with the Baldwin plant, for the repair of "25 or more" locomotives, was entered into April 8, 1920. This contract was on a cost-plus basis, that is, material at stipulated prices and the cost of direct labor, plus 90 per cent of distributed labor to cover all overhead expense, plus 15 per cent of the whole for profit. Upon respondent's initiative from time to time, 87 locomotives in all were required under the contract.

Reasons for Outside Repair Work

In addition to its roundhouses, in which the so-called running or unclassified repairs are usually made, respondent has two shops in which its locomotives are given classified repairs. One is at Ashley, Pa., and the other is at Elizabethport, N. J. It appears that the Ashley shop is and for some time has been more or less obsolete in type and equipment, and the evidence deals almost wholly with the Elizabethport shop. It would also appear that since 1914, with the acquisition of new locomotives of increased size and tractive power, respondent has had some difficulty in maintaining the necessary classified repairs in its own shops. Budget provisions were made in 1916 and again in 1921 for rebuilding the Ashley shop and for enlarging the Elizabethport shop, but the first went by default upon this country's entry into the World War and the second for financial reasons. The principal grounds upon which respondent relies in justification of the contracts are (1) an accumulation of deferred maintenance of equipment during federal control, (2) physical inadequacy of its

shops, (3) inefficiency of its shop labor as a result of the working rules instituted by the Railroad Administration and the substitution, without distinction as to individual proficiency, of standardized hourly rates of pay to shop craftsmen for the former piece-work basis of compensation, and (4) the prospectively increasing demand for power to move traffic.

At the beginning of federal control respondent owned 532 locomotives. To this number 46 were added for respondent's account and one locomotive was "scrapped" during the period of that control, making, with a further deduction of 17 waiting disposition or dismantling, an effective total of 560 returned upon the resumption of private control. The latter number is exclusive of 19 Russian decapods (freight) placed on the line in 1918 by the Railroad Administration and retained by respondent until April and May, 1920, when in two lots they were turned over to the War Department, respondent having in those months received on its own account 11 new heavy Mikado freight locomotives. The Russian locomotives were not repaired by respondent before they were returned and therefore do not affect the shop problem as of the period of the contract repairs. Commencing with November, 1918, and attaining a total of 17 in February, 1920, locomotives were set aside from time to time for dismantling or other disposition, and in all 29 were destroyed between April, 1920, and the end of 1921. Excluding the locomotives destroyed and those awaiting disposition and including the 11 new Mikados, respondent's ownership declined from an effective total of 575 in November, 1918, to 558 with the close of 1921.

The total tractive power of the owned locomotives increased from 14,806,637 lb. in January, 1918, to an effective total of 16,643,694 lb. upon the resumption of private control; an increase of slightly more than 12.4 per cent. The 11 Mikados added in April and May, 1920, minus the locomotives set aside and destroyed, further increased the effective total tractive power of the ultimate 558 in service at the end of 1921 to 17,052,357 lb. The Mikados, having then been new, do not appear to have added to the shop burden during the period of the contract repairs, and their aggregate tractive power of 657,811 pounds was available for the movement of traffic.

The concurrent demand for motive power is exhibited by the investigators in graphic form. The chart shows that the mileage of the locomotives in all services gradually declined from a peak at the end of August, 1918, until the beginning of March, 1919, when it gradually ascended until the end of August, 1919, fluctuated until the end of March, 1920, sharply declined in April to its lowest point, rapidly rose and again attained the former peak at the end of August, 1920, when it again gradually declined. The curve showing the gross-ton-freight-miles for the same period closely follows the curve of the locomotive mileage.

Locomotive Condition

According to one of respondent's exhibits, on January 1, 1918, when federal control began, 54 locomotives were in and awaiting shop for classified repairs, and on February 29, 1920, the end of the period, the number had increased to 88. A tabulation of those estimated as of those dates to have been respectively due for shopping in one, two, and three months indicates similar increases. An exhibit prepared by the investigators from data furnished by respondent shows 54 locomotives in shop for class repairs in July, 1918, and 51 in March, 1920, with 9 and 18 awaiting shop for such repairs at those times, respectively. The corresponding numbers in shop for unclassified repairs were 23 and 35, and those awaiting shop therefor were 3 and 11. Although the information came from the same source, the latter exhibit indicates an aggregate increase of but 6 locomotives in and awaiting shop for classified repairs as against an increase of 34 shown by respondent's own exhibit, and the latter may inadvertently have included those due for unclassified repairs. Some difference in the showing, although apparently not much, might have appeared had the data furnished for the investigators' exhibit commenced with January, instead of July, 1918. At the end of 1920 the aggregate in and awaiting shop for classified repairs had declined to 52, and for unclassified repairs, to 33, or gains of 17 and 13, respectively, over March of that year.

The investigators' exhibit shows 14 per cent of the total locomotives on line out of service for all repairs requiring 24 hours or over at the end of January, 1918, and 19.3 per cent at the end of federal control. The included percentages pertaining to classified repairs are shown as 10.8 and 11, respectively. The conclusions drawn therefrom are that in respect of classified repairs, as far as the percentages go, the situation at the end of federal control was substantially the same as at the beginning, but that in respect of unclassified repairs it was a little less favorable. It is conceded, however, that an equal percentage out of service for classified repairs at the end of federal control would mean a slightly increased burden on the shops by reason of the increase in the number and size of the locomotives.

The number of stored serviceable locomotives ranged from 4 in July, 1918, generally upward to a peak of 43 in March, 1919, but had dropped to 6 at the end of federal control, and is shown

as 1 in each of the four months June to September, 1920. In October it increased to 13, and thereafter ranged upward as high as 66. The tractive-power curve follows the same course.

By way of challenge of respondent's showing of an increase in the number of locomotives estimated to be due for shopping one month from time of inspection, for example, it is pointed out that of 518 so estimated during 1919 but 379 were taken out of service at the end of a month, and that of 695 locomotives so estimated in 1920 but 378 were so withdrawn. These figures are cited as indicating the unreliability of such estimates.

An exhibit compiled from reports of field inspectors to the Bureau of Locomotive Inspection contrasts the results of inspections of respondent's locomotives for the five years indicated; it being explained in that connection that locomotives may be ordered out of service for defects not requiring correction by classified repairs:

Year	Number inspected	Percentage found defective	Number ordered out of service	Per cent inspected ordered out of service
1916.....	250	48	20	8
1917.....	171	65	13	7.6
1918.....	419	76	60	14.3
1919.....	458	64	63	13.7
1920.....	369	72	54	14.6

An exhibit by respondent shows by months the numbers of locomotives which received class repairs in its shops and engine houses during the years 1915 to 1920, omitting 1916, and during the first nine months of 1921. For the most part the indicated monthly output runs from around 23 to 45, and the yearly totals were 392 in 1915, 353 in 1917, 443 in 1918, 430 in 1919, 385 in 1920, and 189 in the nine months of 1921. The roundhouses are credited with none of the repairs prior to July, 1918, but commencing with that month and in each month thereafter during the period embraced by the exhibit the roundhouses turned out from 1 to 8 class repairs, and in one of the months turned out 13, a total of 156. The output of unclassified repairs was slightly less in 1920 than in 1919, and for the first six months of 1921 showed a slight increase.

Prior to federal control respondent sent none of its locomotives to outside shops for repairs; on the contrary during the summer months or dull period of almost every year respondent built from 2 to 5 locomotives of its usual types as additions and replacements. During the federal period, however, 59 of respondent's locomotives received class repairs in other shops, which were completed, 40 in 1918, 11 in 1919, and 8 within the first two months of 1920. All were repaired in the shops of other railroads, with the exception of 3 shown by respondent as having been repaired by the Atlas Portland Cement Company and of which the Railroad Administration appears to have no record. On the other hand, during the same period 19 locomotives, practically all of them the property of industrial concerns served by respondent, were given class repairs in respondent's shops.

Cost of Outside Repair Work

The total cost of the repairs on 18 locomotives by the American plant is shown as \$566,138.07. To a relatively small extent this figure includes estimates on certain items, such as unadjusted contract figures on a few of the locomotives and certain costs based upon those incurred for other similar work. The total cost of the repairs on 72 locomotives repaired by the Baldwin plant is shown as \$1,726,097.80. On the basis of comparable work in respondent's shops, inclusive of equated labor, shop expense, material used, and storehouse handling, minus material recovered, the computed total excess cost of the Baldwin repairs is \$468,120.35, or an average of slightly over \$6,500 per locomotive, and of the American repairs, \$188,701.91, or an average of nearly \$10,484 per locomotive. These figures, which embrace 90 of the 115 locomotives repaired, necessarily assume that all the work could have been performed in respondent's own shops.

There is much evidence of inefficiency of shop labor, attributed by respondent principally to a relaxation of discipline and an abatement of effort by reason of the working rules and conditions and the standardized wage scales, in lieu of piece work, inaugurated during federal control. These things, plus a labor turn-over, including some incompetent recruits, and to some extent a shortage of labor, are said to have resulted in a materially reduced output. To corroborate the general evidence respondent submits a tabulation of steadily increased man-hours per locomotives repaired and per equated unit of output in 1918, 1919, and 1920, and as compared with 1915. An increased cost per unit is also illustrated. On the other hand, the intervener submits considerable evidence to show inefficiency in shop management for various detailed reasons. On both sides it is asserted that there was a marked inefficiency in shop performance during federal control, the difference of opinion being only in the causes assigned. The comparison of the annual output during that period with the output in 1915 and 1917, hereinbefore shown, hardly bears out this assertion. It is testified for respondent that more recently there has been a "big improvement" in shop output.

February 28, 1921, respondent's Elizabethport shop was closed. April 16, approximately seven weeks later, it was reopened with a 50 per cent working force, which was increased by degrees until in September a full force was again employed. Respondent's explanation is that this action was taken for financial reasons, and a showing of economies effected in that way and in other branches of the service to offset current shortages in revenues is submitted of record. The explanation is questioned by reference to the action of the Elizabeth, N. J., Chamber of Commerce in proposing to respondent's president an issuance to the shopmen of certificates of indebtedness, in lieu of cash, which the men were said to be willing to accept, and to the reply that respondent's financial condition was then not good; that respondent was unwilling to issue "I. O. U.'s"; and that the shop might be reopened if the employees would accept "the rates of wages and conditions of employment paid by manufacturers, contractors and other employers for similar classes of work in the communities in which they are employed." A few days before the shop was closed 5 locomotives were sent to the Baldwin plant, and thereafter, prior to the resumption of full-force work in respondent's shop, 10 more were sent to that plant, at an excess cost of \$97,500. While the shop was closed 5 locomotives were sent to the American plant, and 10 more were sent during the period when respondent's shop was operating with a partial force, at an excess cost of \$157,260. The total excess for the 30 locomotives was \$244,760. As there were no outstanding contract obligations when the shop was closed, the sending of those locomotives to the two plants was voluntary.

Weighing the data embraced in the foregoing review, it may be conceded that in respect of the shop burden respondent's motive-power conditions were somewhat less favorable at the end of federal control than at the beginning, and that as early as May, 1920, there was a prospect of an increasing demand for power. On the other hand, considering the good shop performance in 1918 and the material outside assistance received in 1918-1919, and conceding some indeterminable degree of inefficiency, the claimed incapacity of the shops to meet the burden to the extent of the number of locomotives repaired under the contracts is not borne out by the record. As before stated, a total of 115 locomotives received such repairs. This was approximately 20 per cent of respondent's total ownership when federal control terminated, and slightly more than that percentage of the effective total through the contract period. Even though some assistance may have been necessary or expedient in the beginning as an emergency step, the record strongly negatives a conclusion that it was necessary to supplement the material outside help received during federal control by contracting for the repair of so great a proportion of the total motive power. The percentage of locomotives out of service for classified repairs at the end of federal control was not greatly in excess of the 10 per cent considered by respondent as about normal, the remainder of the requirements having been the unclassified repairs commonly cared for in the round-houses; and the 60 locomotives sent to the contract shops in 1920 represented slightly more than 10 per cent of the total ownership. This transaction was followed in 1921 by sending to the contract shops 55 more locomotives, at least 30 of which were so sent during or because of the successive closing down and partial operation of respondent's Elizabethport shop. While it may not have appealed to respondent as desirable in itself to issue certificates of indebtedness to its shopmen, it would appear to have been in the interest of economy in the end to have adopted that alternative.

Shop Improvement Held More Desirable

As repairs to 25 locomotives under the contracts were completed after the investigators finished their field work, the total cost of the work is not shown, but the figures covering the 90 embraced in that investigation indicate that it was high. The record convinces us that the contract work was carried beyond the reasonable necessities and that a large part of the excess expenditures could have been avoided. At all events, respondent has pointedly emphasized the inadequacy of its own shop facilities and set up financial considerations in excuse of its failure to provide them as required. The aggregate amount expended for the contract repairs in excess of the cost of similar work in respondent's own shop, inadequate as they are, shown again and again in this investigation to be the inevitable incident of repairs so procured, would at least have gone far toward the enlargement and modernizing of the company shops and equipment. Certainly, it should be no more difficult to finance an appropriate expansion of respondent's facilities than to finance extensive and expensive repair work outside; and as certainly it would be preeminently in the interest of efficient and economical management to expend the company's funds, not for contract repairs having at best a limited life, but for admittedly much-needed permanent facilities for the continued maintenance of the power on decidedly more favorable terms. Up to the time of the hearing no steps in that direction appear to have been taken.

Commissioner Potter Dissents

Potter, *Commissioner*, dissenting:

Work done either in company shops or outside may involve unreasonable expenditures in the sense that because of some error of judgment the expenditure was undue. To err in judgment is not to violate the law, nor does the making of an excessive expenditure necessarily reflect inefficient or uneconomical management. I am not able to see in this case that a conclusion that the outside work was done in "disregard of efficient and economical management" is justified. Hindsight is frequently better than foresight. Mistake may have been made, but there is nothing indicating that it was made in disregard of proper management requirements. It is not clear that a mistake was made. It is difficult or impossible for us now to put ourselves into the position of the managers of this property in 1920 or 1921. There is no suggestion in the record or in the report that the management did not believe it was doing what the best interests of its company required. The management was quite as competent then to determine what the facts required as we are so to determine at this late date.

Adequacy of Shop Facilities

The report recognizes that one of the respondent's shops was antiquated at the close of federal control, and that to some degree inefficiency prevailed at the close of that period. Locomotives had been sent to outside shops during federal control. At the time of the resumption of private operation, the management was confronted with many uncertainties, including those of labor readjustment and traffic volume. There was reason then to anticipate a rapid increase in traffic volume and demand for equipment, and a large increase in fact came during the succeeding months of 1920. It would appear that there was justification for bringing equipment to a high state of efficiency as soon as possible. Respondent's shops were operated normally during 1920. There is nothing to show that their output could have been increased under circumstances then prevailing. The outside work, therefore, seemingly could not have been done in the respondent's shops during that year. The making of the contract, giving the right to send work outside, apparently was a sound precautionary step. Just what the circumstances and prospects were from day to day, when it was decided to send locomotives out, we can not possibly now understand. We may not fairly criticize the exercise of a judgment, the good faith of which we do not question.

With the beginning of 1921 the volume of traffic moving lessened. The respondent shut its shops early in that year. There may or may not have been justification for so doing. The record does not justify a conclusion either way. It appears that respondent was endeavoring to reduce wages, and perhaps it is to be inferred that the locomotives were sent out in order to strengthen respondent's position in dealing with labor. We are at liberty to be out of sympathy with such an aim, but on the record are not justified in concluding that from the respondent's point of view its course was not justified.



P. & A.

What a Derailed Car Did to a Bridge in Flood Time at Lafayette, Ind.

U. S. Contests Northern Pacific Land Grant

Congressional Investigation to Consider Conflicting Claims of the Government and the Railway

THE LONG STANDING dispute between the Department of the Interior of the United States Government and the Northern Pacific over the deficiency in the amount of land received by the railroad in accordance with the government grant in 1864 to aid in the construction of the railway has lately become an issue of national interest and a subject for investigation by a congressional committee. The original grant included approximately 44,000,000 acres, of which nearly 40,000,000 acres have been transferred to the Northern Pacific. The adjustment of the land grant, involving the transfer of the remaining 3,900,000 acres, will be held up until March 4, 1926, as a result of passage by the Senate and House of Representatives of a bill directing the Secretary of the Interior to withhold the issue of any further patents until a full inquiry into the respective rights of the two parties has been made.

The present controversy has arisen as a result of the attempt to agree upon an adjustment of the Northern Pacific's claim for lands taken over by the government. These lands were withdrawn from time to time by the government, for preservation as forest lands, until April, 1921, when the Supreme Court held the practice to be illegal since national forest lands are now the only lands available to complete the transfer of the original grant.

The attention of the House Committee on Public Lands was directed to the dispute by a letter from President Coolidge on February 23 of this year. The President's letter referred to and quoted from a letter of the secretary of agriculture in which 12 reasons were given to show that under its grant the Northern Pacific had already received more land than it was equitably entitled to receive and asked congressional action to insure the retention, if possible, of the disputed national forest lands. A preliminary hearing of the House Committee on Public Lands began on March 1 and the contentions of the government and of the railway were then presented.

Terms of the Grant

The Northern Pacific land grant became effective on July 2, 1864, when President Lincoln approved an act of Congress by which the corporation known as the Northern Pacific Railroad Company, which proposed the building of a railroad from a point on Lake Superior to a point on Puget Sound, was granted, to aid in its construction, the odd numbered sections of land extending twenty miles in states and forty miles in territories on each side of the track. In order that the company could know exactly what land it was to receive and what land it should not receive, the act provided that the government would cause the lands on each side of the railroad to be surveyed "as fast as may be required by the construction of said railroad" and that with the construction of 25 consecutive miles of any portion of the road, patents should be issued for the granted land on either side of it. Mineral lands, lands occupied by settlers and lands reserved for other purposes, were excepted from the grant and the act provided that wherever a section was lost to the company for any of these reasons, the company should have a right to select as indemnity an equal quantity of land from the odd numbered sections within certain defined belts lying contiguous to the lands granted. The odd numbered sections directly granted by the act came to be known as "place" land and the limits within which they were found were called the "place limits" of the grant. The odd num-

bered sections selectable as indemnity for place land losses came to be known as "indemnity" land and the defined limits within which these were found were called the "indemnity limits" of the grant.

The original grant specified July 4, 1866, as the date before which construction was to begin and July 4, 1876, as the date when it was to be completed, but in an act of May 7, 1866, the time for commencing and completing the construction was extended for a period of two years and in another act of July 1, 1868, the company was given until July 2, 1870, to begin construction and until July 4, 1877, to complete the road, which latter date, it is contended, was extended to July 4, 1879. Further acts of Congress provided for the settlement of contests between the railway and settlers upon indemnity land and authorized the exchange of granted land within the Mt. Rainier National Forest and the Pacific Forest Reserve for unappropriated and unreserved non-mineral public lands in any state through which the roads pass.

In a joint resolution of May 31, 1870, the original grant was modified and enlarged to: (a) authorize the issuance of bonds by the company secured by mortgage on its property; (b) provide for the location and construction of its main line via the Columbia river to some point on Puget Sound with a grant of land therefor as provided in the act of 1864; (c) provide for additional indemnity limits to satisfy losses incurred between the date of the original grant and the time of definite location; (d) provide that all lands thereby granted, which should not be sold or disposed of or remain subject to mortgage at the end of five years after the completion of the road should be subject to settlement and pre-emption at a price to be paid to the company not exceeding \$2.50 per acre; (e) provide for the sale at the places within the states where situated of the mortgage lands in the event of foreclosure or sale by the trustees.

While the total grant was approximately 44,000,000 acres, only 1,000,000 had been received by the road in 1887 when the line was completed. To date, nearly 39,000,000 acres more have been received, the balance being the subject of the present dispute.

The practice of withdrawal by the government of land within the indemnity limits had been ineffectually protested by the Northern Pacific for years, particularly when available land to satisfy the grant became scarce. In April, 1921, the case was made the subject of a decision by the United States Supreme Court in the case of the United States versus Northern Pacific Railway Company (256 U. S. 51). Up to this time the total area of the disputed lands embraced in the withdrawals was approximately 3,000,000 acres. The decision of the Supreme Court was that odd numbered sections within the indemnity limit of the grant could not be withdrawn for federal purposes if they were needed to satisfy the acreage of the grant. It further held that on the record as it then stood, it could not be determined in the case at bar whether there was such a deficiency in the grant as would defeat the withdrawal for forest uses, and hence remanded the case for a supplemental showing in that particular.

As a result of this decision the general land office took up the adjustment of the Northern Pacific grant. On December 19, 1923, a tentative adjustment of the grant, as disclosed by the records of the general land office, was submitted, showing a deficiency in the grant of 3,900,000 acres. When it became apparent that forest lands were alone avail-

able to satisfy the railway's claim, an investigation of the entire grant was undertaken by the forester of the general land office.

In a letter of January 12, 1924, addressed to the commissioner of the general land office, E. A. Sherman, acting forester, enumerated a number of detailed points which the government might use as a basis for contesting the patenting of further lands to the Northern Pacific. His suggestions are: To show that mineral losses in the primary limits may not be satisfied in the second indemnity limits of the grant except in Wisconsin, Minnesota and Oregon; to deduct from the Northern Pacific grant the area of conflict with the Portage, Winnebago & Superior railroad, involving 370,378 acres; to deduct the error of the primary limits through Montana and Idaho, involving 144,000 acres; to correct the error in the location of the primary first and second indemnity limit lines through Montana and Idaho, thereby releasing over 100,000 acres from the second indemnity limits; to deduct for the Tacoma overlap, involving 638,451 acres; to deduct the excess acreage of the grant through Washington, with 1,500,000 acres involved; to show in detail the circumstances surrounding the Wallula overlap act of May 2, 1906, and the resulting benefit to the Northern Pacific and to deduct from the grant the acreage of the main line moiety lands in the Wallula overlap, 590,000 acres being involved; to show the full facts covering the erroneous classification of mineral land under the act of February 26, 1895, and the effect of this classification upon the lands of the United States with a view to eliminating the unsatisfied mineral losses from the deficiency figures, the area involved being 2,250,000 acres; to reconsider whether the Crow Indian reservation losses could be satisfied in the second indemnity belt, with 1,300,000 acres involved; to deduct from the Northern Pacific grant an area equal to the acreage sold under the 1875 foreclosure proceedings at private sale in violation of the public sale provision of the joint resolution of May 31, 1870, the area involved being 838,852 acres; to show the length of road not constructed within the time specified by law and the acreage opposite same.

These proposals were taken to the Secretary of the Interior and the Secretary of Agriculture, who in turn addressed them to President Coolidge with the request for a full investigation.

Grounds for Contesting Claim

This request was approved by the President and in a letter to the Public Lands Committee of the House twelve reasons were advanced which, if substantiated, might prove grounds for defeating the Northern Pacific claim. The government claims that if the Northern Pacific failed to meet the requirements of its agreement or received a greater acreage or greater values than it was equitably entitled to receive, Congress has authority to save portions of the national forest lands claimed by the Northern Pacific under the grant to the government. The President's points, which include and elaborate on those of the forester, and their answer by the Northern Pacific are as follows:

(1) "That the land grants were made for the purpose of aiding in the construction of the railroad. The total gross receipts of the Northern Pacific to June 30, 1917, from the sale of the land from its grant amounted to \$136,118,533. The cost of constructing the road did not exceed \$70,000,000. The sale of land has more than paid for the cost of constructing the railroad." The railway claims that, even if accurate, these statements are not relevant because the grant was absolute and was made without reference to the relation or proportion which its value should bear to the cost to the railroad. The railway declares, however, that the net receipts to December 31, 1923, from all land grant sources, plus the amount of the deferred payments yet due under contracts, plus the estimated returns to be received from unsold land, equal \$100,065,732. The net receipts have been \$77,800,710 and

there is due under contracts \$7,265,022. It is estimated that the unsold land will produce net returns amounting to about \$15,000,000. The sum of \$77,800,710 actually received was of course not all received at once, it being the total of the receipts accumulated during the 54 years since construction began.

(2) "That the Northern Pacific failed to construct 1,507.21 miles of its railroad within the time required by law, thereby rendering the grant of land subject to forfeiture." The Northern Pacific claims that there is doubt, as a result of subsequent legislation, whether there was any fixed period within which construction was to be completed. Regardless of that, the railroad, when and as constructed, was accepted formally by the President of the United States; for more than 40 years the government has dealt with it as having met the law's requirements; Congress has enacted some 28 statutes recognizing that it has met them and the government, throughout that period, has enjoyed the benefit of reduced land grant rates for the movement of its traffic over it.

(3) "That the Northern Pacific failed to dispose of certain of its land to settlers at not to exceed \$2.50 per acre as required by the law." The Northern Pacific denies that this was required by law and claims that the contention was rejected 15 years ago by the Secretary of the Interior. Settlers who advanced the question did not take it into court and it was never thereafter revived.

(4) "That the Northern Pacific failed to dispose of hundreds of thousands of acres of its land at public sale as required by law." The railway claims that this is an attack upon the decree of sale entered by the United States court in the foreclosure proceedings of 1875, a decree which was in every respect a valid one.

(5) "That hundreds of thousands of acres of poor land in the Northern Pacific grant were erroneously classified as mineral. This land was turned back to the United States and the railroad acquired mineral indemnity rights therefor, which were applied in part on more valuable land in the indemnity limits." The Northern Pacific points to the fact that the mineral classification commission, a government body, was responsible for all classifications of granted land. The railway was therefore not responsible for their findings.

(6) "That under a rule of law laid down by the Supreme Court the Northern Pacific has been erroneously allowed 1,500,000 acres too much land in the state of Washington." This claim is based upon the fact that the Northern Pacific did not build the most direct line across the state of Washington and on account of the increased mileage, received a greater number of sections of land. The Northern Pacific claims that it was not obligated to construct the shortest line since it was given authority by Congress to fix its own route and the government accepted the line constructed 40 years ago.

(7) "That over 500,000 acres of land credited to the Northern Pacific should be deducted because of conflict with the land grant of another road and the erroneous fixation of the land grant limit lines." The Northern Pacific concedes this to be an open question which may be decided against it. However, it claims that whatever the decision of the Secretary of the Interior is, it would not affect its right to the land in the so-called forest reserve because even after the elimination of these 500,000 acres, the deficiency in the grant is in excess of the land available with which to satisfy it.

(8) "That approximately 640,000 acres of land have been erroneously allowed the Northern Pacific by reason of the Tacoma overlap." This "overlap" results from the overlapping of grants of lands adjacent to the line from Wallula to Tacoma and the line from Portland to Tacoma. The Northern Pacific claims that this is squarely opposed to the uniform decisions of the Department of the Interior.

(9) "That the Northern Pacific has received approxi-

mately 600,000 acres of land to which it was not entitled under its grant in the Wallula overlap." This arises from a conflict in the land grant limits of the line from Wallula to Tacoma and the grant opposite the unconstructed line from Wallula to Portland. The railway contends that this is an attempt to revive a controversy set at rest 20 years ago by the Supreme Court of the United States in the case of the United States versus the Northern Pacific Railway Company (193 U. S. 1).

(10) "That the Northern Pacific has been allowed to make over 1,300,000 acres of indemnity selections in its second indemnity belt whereas the selection should have been confined to the first indemnity belt." The Northern Pacific claims that this question was settled 38 years ago by the Supreme Court of the United States in the case of Buttz versus Northern Pacific Railway Company (119 U. S. 55).

(11) "That for lands erroneously patented to the Northern Pacific, the government should be entitled to receive at least what the railroad received from the sale of these lands instead of \$1.25 per acre." The Northern Pacific claims that on its face the question appears to be squarely opposed to the decision of the Supreme Court in the case of United States vs. Winona Railroad Company (165 U. S. 463). The railway further denies the relevancy of this contention to the specific question of the forest reserve land.

(12) "That the Northern Pacific, under the Mt. Rainier Park act of March 2, 1899, relinquished to the United States thousands of acres of commercially valueless land and received therefor selection privileges applicable to the finest land they could find in the states of Oregon, Washington, Idaho, Montana, North Dakota, Minnesota and Wisconsin." The Northern Pacific denies that the land affected in the exchange caused by the creation of Mt. Rainier Park was valueless and that the lands received by the company were "the finest to be found," as charged. In any event, the railway claims, the transaction involved simply the acceptance by the Northern Pacific of a proposal made by the government through an act of Congress; and it was closed 25 years ago.

Moral Considerations

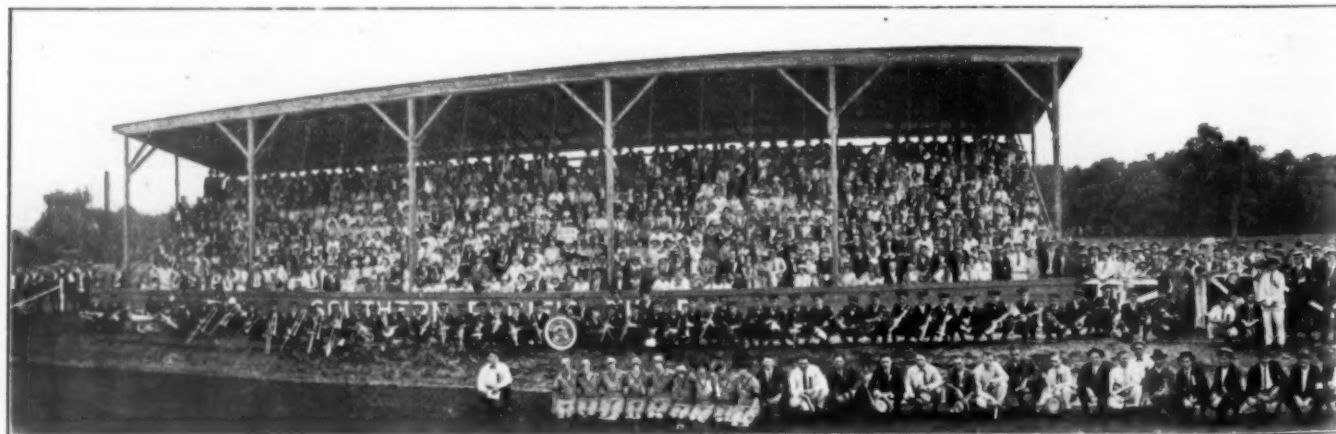
In its defense, the Northern Pacific points to certain equitable and moral considerations involved in the dispute. In discussing these elements, a statement by the Northern Pacific says, "Much is said of the munificence of the grant made to the Northern Pacific and it is said that the moral obligations of the government have been discharged even though the government should retain as part of the national forests, lands which the courts have said belong to the railway company. Premising merely that it is hardly fair in construing a con-

tract upon which immense property rights rest to allow one of the parties to it to fix as against the other the measure of its obligations, whether legal or moral, we invite attention to certain equitable and moral considerations on the side of the railway company which there is a tendency to overlook or to forget.

"It is a mistake to regard the Northern Pacific grant as a mere private measure taken for the promotion of private interests. It was made during the Civil War, as a war measure, 'to aid in the construction of a railroad,' and 'to secure the safe and speedy transportation of the mails, troops and munitions of war;' and among the 134 eminent men from all parts of the United States, who in 1864 were named in the act as incorporators of the company, were men like General U. S. Grant, then actively engaged in waging the war. The appeal was made, not to any group of financiers, but to the entire public of which the incorporators were supposed to be representative; and it was especially provided in the act 'that all people of the United States shall have the right to subscribe to the stock.' The government gift, therefore, was made available to all, yet so little attraction did it then possess that it was found impossible to interest the public in the enterprise which it was to aid. They refused to take stock in it and not until 1870, when an act was passed authorizing a mortgage, did it become possible to get it fairly launched. The support of the great banking house of Jay Cooke & Co. was then given to it; but such were its inherent difficulties, even under these conditions and with this support, that in 1873 it went down in failure, and the banking house of Jay Cooke & Co. went down with it. It should be considered then that the grant was made in aid of the construction of a railroad through great stretches of homeless prairies; that the gift was made available to everyone; and that those who did avail themselves of it were ruined in the attempt to carry the undertaking through.

"By the very terms of the granting act, the government took the precaution of re-imbursing itself directly for the aid given. Before the construction of the Northern Pacific the sale price of all the public lands of the United States in the territory which that line penetrated was \$1.25 per acre, and outside the limits of the Northern Pacific grant that continued to be their sale price. Recognizing that the construction of the railroad would enhance the value of the lands adjacent to it, the government doubled the price of the sections it retained adjacent to the railway, and its lands, which before construction were not salable at \$1.25 per acre, were sold readily thereafter at double that price.

"The Northern Pacific Railroad, by the act of 1864, is made a post route and military road subject to such regulations as Congress may impose, restricting the charges for such



Southern Pacific Track and Field Meet, Houston, Texas, June 2

Part of Illustration on the Opposite Page

government transportation. The government has always exercised this right to restrict its charges through acts of Congress, allowing to the Northern Pacific only a reduced percentage of the rates contemporaneously payable to other carriers for like services. The difference between what the Northern Pacific has thus far received for its services to the government and what it would have received if it were not for this land grant restriction is about \$14,000,000. Of the \$100,000,000 which the Northern Pacific has received or will receive from its grant, therefore, it has in effect turned back \$14,000,000 into the United States treasury. And this obligation to accept reduced rates is not a temporary or terminable one. It inheres in the franchise; and whoever owns and operates the Northern Pacific Railroad must bear it to the end of time. And as the value of the land grant to the Northern Pacific, whatever it may be, is something fixed and determinate, while the obligation to remit to the government a portion of its service charges is perpetual, it is certain that unless rail transportation is superseded by transportation of some other form, the Northern Pacific will ultimately turn back to the government all that the government gave to it."

Southern Pacific Athletics at Houston

THE FIRST ANNUAL track and field meet of the officers and employees of the Texas and Louisiana lines of the Southern Pacific Company, which was held at Houston, Tex., on June 2, following elimination trials carried out on the preceding Saturday, marks a very definite expansion in the interest and activities of that company in connection with the outdoor recreations of the employees, the success of the meeting being acclaimed on all sides as phenomenal. A principal feature of the company's interest in these affairs has been the establishment of the large park at Houston, which was the scene of this meet.

These final contests were participated in by delegations from substantially all of the operating divisions, terminals, general offices and shops. They took place in the presence of President W. R. Scott and practically all of the officers, including division chiefs, many of whom accompanied their delegations; and all of whom were enthusiastic in their support of the annual contests.

The events of the meet consisted of:

100 yards run
One mile run
Pole vault
120 yards hurdle

Discus throw
440 yards run
Standing broad jump
220 yards hurdle

75 yards run
Running broad jump
880 yards run
Shot put
220 yards run

50 yards hurdle
Javelin throw
Running high jump
One mile relay race

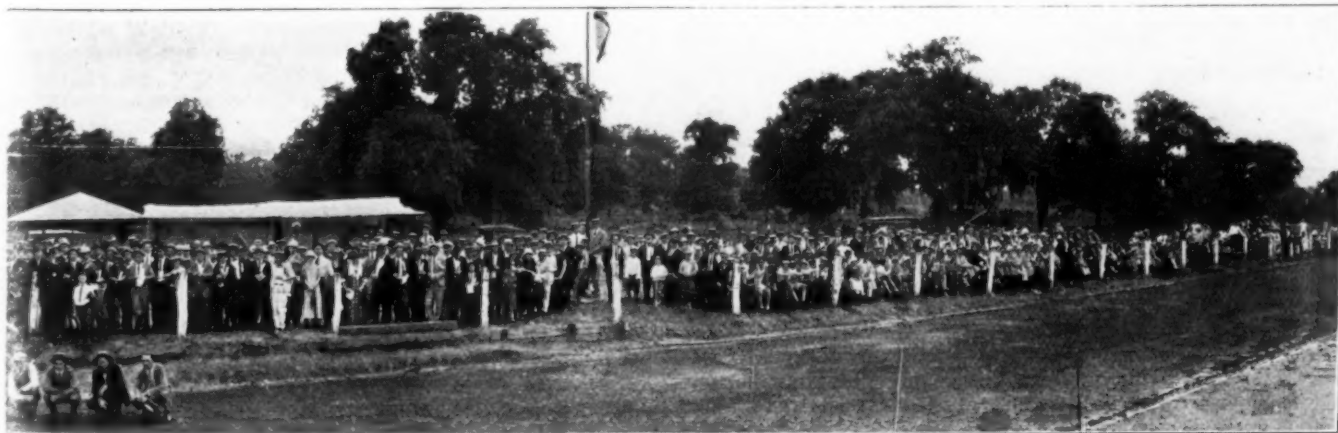
First honors and the "president's trophy" were won by the Houston team with 60 points, New Orleans being second with 43 and Beaumont division taking third place with 39 points. Beaumont division also had the high point man, S. Irvine, brakeman, who won the discus and broad jump; second place in 120 high hurdles, high jump and shot put, and fourth in javelin. Thomsen of Houston won three firsts in the long runs, and Dan Lane, New Orleans, two firsts and one second in the dashes and low hurdles. Payne, also Beaumont division brakeman, won shot put, javelin and second in discus.

President Scott presented a brief sketch of what had been done in the way of preparation, and outlined the future as follows:

"We have only gone back a thousand years or so for our inspiration, and if the old Greeks could inspire the Olympics every four years, I am satisfied that the Southern Pacific can cut out just 75 per cent of the 'lay over,' and have our contests every year. This is what we propose to do and we have every reason to believe that the annual contests, preceded by several months of preparation and participated in by a thousand of our young men in all classes of effort, will not only encourage a healthy interest in the life out of doors and in the sports which call for skill and courage, but it will mean also a better interest in the clean things of life and much better minds and bodies with which to meet the demands of existence.

"We hope to make the 1925 contests a feature of the athletic activities of Texas and Louisiana. Our Houston track is the finest in the Southwest and our field as lovely a location as can be found. In the meantime, Southern Pacific family spirit is an active factor in the development of our lines, and this we shall always endeavor to maintain."

TWO HUNDRED NINETY-SEVEN EMPLOYEES of the Cumberland Valley division of the Pennsylvania Railroad now own stock in the company, having bought recently an aggregate of 983 shares (par value \$50 a share), under the offer made a short time ago by the directors of the road. The Wilkes-Barre district, which had a "drive" in this connection, now reports that every passenger train running out of that district is manned by a stock-owning crew. Every yardmaster in the district, every switchtender, leverman, car dropper, extra engineer and telephone operator owns stock in the company. The percentages of stockholders in the several departments are as follows: clerks, 91 per cent; engineers, 68 per cent; firemen, 68 per cent.



Southern Pacific Employees and Their Friends at Houston, June 2
Part of Illustration on Opposite Page

General News Department

The liquidation sale of the Chicago, Peoria & St. Louis, which has been authorized by the Interstate Commerce Commission, is likely not to be held before autumn. The case is still before the Supreme Court of Illinois.

The Northern Pacific has been authorized by the Interstate Commerce Commission to make the second train control installation required by the Commission's order between Dickinson, N. D., and Glendive, Mont., instead of between St. Paul, Minn., and Mandan, N. D.

The Travelers Insurance Company, Hartford, Conn., announces that group life insurance aggregating \$4,000,000 has been placed with that company on behalf of the clerical forces of the Erie Railroad; also that clerks, signalmen and telegraphers of the Lehigh Valley have lately been insured for an aggregate sum nearly as large. By this Lehigh Valley policy the employees of the classes named are insured for amounts materially larger than heretofore.

International Railway Meeting in Berlin in September

A special railway convention of international scope is announced to be held in Berlin, Germany, from September 22 to 27, 1924, by the Society of German Engineers. An exhibit of locomotives, rolling stock and appliances will be held in connection with the meeting. Lectures by German and foreign specialists on a variety of subjects, and discussions by the delegates will also be a feature. These lectures will include reports on turbine and internal combustion locomotives, air brakes, railway electrification, signaling and the strengthening of track and bridges. A special invitation to American railway officers to attend the meeting has been extended by the committee in charge.

Detroit & Ironton Electrification

Visible evidence of progress toward electrification of the Detroit & Ironton Railroad may be seen in the Rouge erecting shops, according to the last issue of the Detroit, Toledo & Ironton Railroad News.

Nearly all parts to be used in assembly of the first locomotive are in readiness and the construction will begin probably not later than the middle of July. The locomotive will be 117 ft. long, of the 0-8-8+8-8-0 type. There will be a motor for each of the 16 driving axles. The total weight of the locomotive will be 340 tons and the maximum tractive effort 200,000 lb. The first of the eight turbines which will furnish power for the electrification has passed successful operating tests. It will generate 62,500 hp. A 23,000-volt alternating trolley will be used in conjunction with low voltage motors operating on 600 volts direct current. Metal forms are being made for casting the concrete catenary supports.

Canadian Senate Continues to Move

Slowly on C. N. R. Branch Line Bills

Slow progress is being made in the Special Railway Committee of the Canadian Senate which is dealing with the branch line program of the Canadian National Railways. These 26 separate bills for as many different branch lines which the management of that system wishes to build have been subjected to stubborn opposition from a majority of the senate committee and also in the Senate itself where general discussions have taken place. After a month's deliberations at least 20 of the bills have been approved by the senate committee but not reported to the Upper House. While desirous of not holding up the whole program too overtly the senators opposed to the program of the government-owned road have tentatively passed the bills but the latter are subject to being recalled in the Senate proper when the measures reach that stage. Throughout the hearing of these bills experts of the Canadian Pacific—the privately owned road—have been in attendance at the request of the committee to state their objections to any lines.

Heavy Taxation of Railroads

This is the subject of the latest broadside advertisement put out by the New York, New Haven & Hartford. Calling attention to the gross amount of taxes paid by the railroads of the country, 366 millions a year, or a million dollars a day, the statement continues: The unfairness of taxes based upon gross rather than net revenue is apparent from the following figures of the New Haven company:

In 1913 after paying car hire and terminal rents it earned from operations.....	\$20,102,919	
and paid taxes of.....		\$3,714,756
In 1923 from the same source it earned.....	\$18,211,732	
and paid taxes of.....		\$4,934,004
A decrease in earnings of.....	\$1,891,187	
and an increase in taxes of.....		\$1,219,248

With earnings of nearly \$1,900,000 less the road paid over \$1,200,000 more in taxes.

Canadian Railways Minister Studying

Toronto Grade Crossing Problem

Another step toward an early solution of the Toronto viaduct problem was taken last week following a conference in Ottawa between George P. Graham, Minister of Railways and Canals, and the various Toronto interests. At the conclusion of that parley the minister announced that Col. A. E. Dubuc, chief engineer of the Department of Railways and Canals, would go to Toronto and make an independent inquiry into the situation and report back to the minister in ten days so that the federal government could make some proposal to Parliament before the latter's prorogation for this session. At the end of last week Mr. Graham went to Toronto and there with Col. Dubuc and some officers of the Canadian National Railways went over the project.

In 1913 the City of Toronto and the Toronto Harbor Board entered into an agreement with the Canadian Pacific and Grand Trunk for the construction of a new union station and a viaduct from that station to the eastern end of the city. The station was completed during the war at a cost of about \$3,000,000 and has been unused by the traveling public since its completion, about seven years ago. When the war broke out the parties to the contract decided to allow the viaduct part of the pact to stand. That project would have cost about \$30,000,000. In the latter part of the war and since many efforts have been made by the city of Toronto to commence the viaduct construction, as the Harbor Board had spent millions of dollars south of the railway right of way at the waterfront in reclamation and in building up a large industrial area which was now badly in need of viaduct facilities.

A new factor entered the situation late in the war when the Dominion government acquired the Grand Trunk with all its obligations, contractual and otherwise, in addition to later taking over the Canadian Northern, the Grand Trunk Pacific and other lines. These have been consolidated in the Canadian National Railways, so that the federal government as the owner and financier of these lines takes the place of the former Grand Trunk as a party to the Toronto viaduct agreement. The Canadian Pacific and the dominion government have both admitted their obligations to carry out the agreement with the city of Toronto. What is now holding up the project is an endeavor by the railways and the government to effect some compromise with the City of Toronto and the Toronto Harbor Board whereby the cost of the viaduct can be lessened. The government doubts its ability to get a large vote to carry out its part of the bargain through the federal Parliament.

Hon. George P. Graham, in his announcement following the conference in Ottawa early last week and in his statement in Toronto three or four days later made it clear that no instructions had been given to Col. Dubuc other than to bring in an independent report and that on that report would be based the government's proposal to Parliament. Those who took part in the conference here were: Sir Henry Thornton, president of the Canadian Na-

tional; Gerard G. Ruel, vice-president, C. N. R.; Major Graham A. Bell, Deputy Minister of Railways and Canals; Mayor W. W. Hiltz, of Toronto, and the four members of the Toronto Board of Control; also E. L. Cousins, chief engineer, and Major A. A. Mulholland, one of the members of the Toronto Harbor Board.

New York to San Francisco in Twenty-two Hours

Lieutenant Russel L. Maughan, flying in a Curtiss 12-cylinder bi-plane, made the trip from New York City to San Francisco, Cal., on Monday, June 24, in 21 hours 49 minutes, including five stops, which took 3 hours 23 minutes, leaving the net flying time 18 hours 26 minutes. Lieutenant Maughan left New York (Mineola) at 2:59 a. m., Eastern Time, and reached San Fran-

cisco at 9:48 p. m., Pacific Time. He stopped at Dayton, Ohio, St. Joseph, Mo., North Platte, Neb., Cheyenne, Wyo., and Solduro, Utah. At Dayton he was detained 1 hour, 10 minutes, because of the necessity of repairing a gasoline pipe. The distance flown on this trip is estimated at 2,670 miles, which makes the average rate of speed, including stops, about 122 miles an hour; excluding stops, nearly 145 miles an hour.

The Post Office Department announces that the regular schedules for aeroplane transportation of letters between New York and San Francisco will go into effect on July 1, in accordance with the plans heretofore made public. Westbound, the flyers will start at 10 a. m., Eastern Time, and be due in San Francisco at 5:45 p. m., Pacific Time; traveling time, 34 hours, 45 minutes. Eastbound, leave San Francisco 6 a. m., Pacific

OPERATING REVENUES AND OPERATING EXPENSES OF CLASS I STEAM ROADS IN THE UNITED STATES*

(FOR 193 STEAM ROADS, INCLUDING 15 SWITCHING AND TERMINAL COMPANIES)

FOR THE MONTH OF APRIL, 1924 AND 1923

Item	United States		Eastern District		Pacifi-centas Region		Southern Region		Western District	
	1924	1923	1924	1923	1924	1923	1924	1923	1924	1923
Average number of miles operated	235,937.78	235,640.58	59,459.75	59,306.79	5,461.87	5,448.92	38,335.62	38,439.93	132,680.48	132,444.94
Revenues:										
Freight	\$342,782,608	\$386,296,958	\$156,392,706	\$187,238,613	\$15,406,293	\$15,929,258	\$48,638,545	\$51,653,317	\$122,345,064	\$131,475,770
Passenger	685,196,370	87,842,300	41,720,849	42,180,810	2,146,136	2,218,862	11,792,609	12,253,101	29,536,776	31,189,527
Mail	8,140,786	7,594,324	3,169,179	2,828,773	196,908	186,322	1,136,523	1,082,348	3,638,176	3,496,881
Express	12,644,663	14,026,758	5,539,171	6,280,236	292,245	305,675	2,005,969	2,032,939	4,807,278	5,407,908
All other transportation	16,080,201	16,651,998	9,062,574	9,550,697	257,758	225,541	919,522	1,064,881	5,840,347	5,810,879
Incidental	9,351,436	10,285,483	4,860,787	5,765,307	347,643	356,978	1,159,116	1,100,278	2,983,890	3,062,920
Joint facility—Cr.	819,056	847,041	346,593	386,871	15,214	17,585	144,652	151,628	312,597	290,957
Joint facility—Dr.	193,534	241,191	93,029	118,556	1,626	3,779	30,432	31,918	68,447	86,930
Railway operating revenues	474,821,586	523,303,671	220,998,830	254,112,751	18,660,571	19,236,442	65,766,504	69,306,574	169,395,681	180,647,904
Expenses:										
Maintenance of way and structures	68,085,298	65,274,165	27,048,154	27,360,660	2,893,342	2,255,454	9,304,616	9,014,984	28,839,186	26,643,067
Maint'ce of equipment	107,462,296	119,742,105	51,412,216	59,132,977	4,424,785	4,664,150	13,576,092	14,563,317	38,049,203	41,381,661
Traffic	7,384,946	7,532,032	2,963,801	2,726,629	197,064	178,350	1,353,173	1,355,283	3,370,908	3,271,770
Transportation	177,464,829	195,125,461	85,066,446	95,853,769	5,544,244	6,099,058	24,019,322	25,368,119	62,834,817	67,804,515
Miscellaneous operations	3,969,010	3,959,099	1,885,342	1,976,567	92,469	91,107	469,238	374,602	1,521,961	1,516,823
General	13,946,850	13,272,110	6,211,097	5,957,934	437,694	404,841	1,767,510	1,758,335	5,530,549	5,151,000
Transportation for investment—Cr.	1,120,917	756,922	148,639	70,347	27,264	13,118	124,171	54,980	820,843	618,477
Railway operating expenses	377,692,312	404,148,050	174,438,417	192,938,189	13,562,334	13,679,842	50,365,780	52,379,660	139,325,781	145,150,359
Net revenue from railway operations	97,129,274	119,155,621	46,560,413	61,174,562	5,098,237	5,556,600	15,400,724	16,926,914	30,069,900	35,497,545
Railway tax accruals	27,281,748	27,618,649	11,233,707	11,689,967	1,234,751	946,801	3,422,629	3,516,264	11,390,661	11,465,617
Uncollectible railway revenues	156,177	156,397	83,232	68,146	3,710	24,535	15,901	10,150	53,334	53,566
Rail'y operat'g income	69,691,349	91,380,575	35,243,474	49,416,449	3,859,776	4,585,264	11,962,194	13,400,500	18,625,905	23,978,362
Equipm't rents—Dr. bal.	6,112,110	5,980,765	4,191,276	4,859,391	d171,261	d526,072	937,958	1,065,780	1,154,137	581,666
Joint facility rent—Dr. balance	1,757,272	1,884,488	1,003,254	927,188	107,874	93,004	3,357	52,172	642,787	812,124
Net railway operating income	61,821,967	83,515,322	30,048,944	43,629,870	3,923,163	5,018,332	11,020,879	12,282,548	16,828,981	22,584,572
Ratio of expenses to revenues (per cent)	79.54	77.23	78.93	75.93	72.68	71.11	76.58	75.58	82.25	80.35

FOR FOUR MONTHS ENDED WITH APRIL, 1924 AND 1923

Average number of miles operated	235,933.79	235,825.69	59,464.40	59,308.19	5,458.52	5,448.37	38,334.88	38,436.59	132,675.99	132,632.54
Revenues:										
Freight	\$1,400,447,599	\$1,478,948,148	\$644,396,370	\$697,331,917	\$63,708,823	\$58,947,794	\$197,972,484	\$204,282,368	\$494,369,922	\$518,386,069
Passenger	347,434,784	346,354,216	163,027,757	162,695,203	8,176,148	8,247,156	52,313,422	51,650,301	123,917,457	124,361,556
Mail	31,922,922	30,249,990	12,325,444	11,375,931	784,526	697,224	4,517,572	4,273,327	14,295,380	13,903,508
Express	46,657,848	49,113,063	20,731,174	23,916,264	1,043,386	1,181,781	6,810,487	5,848,712	18,072,801	18,166,306
All other transportation	61,428,206	62,028,232	35,099,421	35,968,097	714,254	702,774	3,611,973	3,744,321	22,002,548	21,613,040
Incidental	37,070,246	39,539,562	18,987,991	21,826,820	1,358,634	1,328,876	4,675,772	4,500,202	12,067,849	11,883,664
Joint facility—Cr.	3,709,089	3,340,001	1,410,459	1,529,927	59,848	55,722	526,097	561,594	1,712,685	1,192,758
Joint facility—Dr.	835,401	934,286	419,043	491,085	8,409	13,065	125,755	122,780	282,194	307,356
Railway operating revenues	1,927,835,293	2,008,638,926	895,559,573	954,153,074	75,817,220	71,148,262	270,302,052	274,138,045	686,156,448	709,199,545
Expenses:										
Maintenance of way and structures	237,229,294	223,806,811	98,264,724	93,773,561	10,598,381	8,258,752	35,581,629	34,220,755	92,784,560	87,553,743
Maint'ce of equipment	438,052,534	481,063,175	212,957,240	239,036,594	18,947,809	18,386,067	54,155,863	56,450,215	151,991,622	167,190,299
Traffic	31,952,252	30,070,080	12,037,516	11,091,232	797,546	738,353	5,798,456	5,623,712	13,318,734	12,616,783
Transportation	751,766,485	805,595,959	361,419,234	395,256,303	24,901,193	24,939,787	99,896,223	102,737,605	265,549,835	282,662,264
Miscellaneous operations	16,066,967	15,879,910	7,775,066	7,979,320	345,759	334,058	1,828,842	1,604,206	6,117,300	5,962,326
General	56,328,962	53,151,724	25,090,753	23,632,723	1,713,366	1,580,859	7,261,910	6,950,288	22,262,913	20,987,854
Transportation for investment—Cr.	3,870,798	2,592,116	528,995	217,111	84,445	39,604	491,284	379,070	2,766,074	1,956,331
Railway operating expenses	1,527,525,696	1,606,975,543	717,015,538	770,552,622	57,219,629	54,198,272	204,031,639	207,207,711	549,258,890	575,016,938
Net revenue from railway operations	400,309,597	401,663,383	178,544,035	183,600,452	18,597,591	16,949,990	66,270,413	66,930,334	136,897,558	134,182,607
Railway tax accruals	106,025,024	104,213,387	42,686,200	41,540,426	4,690,092	3,756,932	13,707,981	13,420,918	44,940,751	45,495,111
Uncollectible railway revenues	689,572	565,939	298,213	256,123	10,534	37,028	59,467	46,198	321,358	226,590
Rail'y operat'g income	293,595,001	296,884,057	135,559,622	141,803,903	13,896,965	13,156,030	52,502,965	53,463,218	91,635,449	88,460,906
Equipm't rents—Dr. bal.	22,530,028	22,068,000	14,807,677	17,250,071	d1,281,146	d1,966,172	2,518,963	3,532,936	6,484,534	3,251,165
Joint facility rent—Dr. balance	6,332,560	6,623,429	2,984,255	3,261,275	418,213	356,600	317,962	205,502	2,612,130	2,800,052
Net railway operating income	264,732,413	268,192,628	117,767,690	121,292,557	14,759,898	14,765,602	49,666,040	49,724,780	82,538,785	82,409,689
Ratio of expenses to revenues (per cent)	79.24	80.00	80.06	80.76	75.47	76.18	75.48	75.59	80.05	81.08

Does not include Boston & Albany, the revenues and expenses of which are included in New York Central report.

b Includes \$2,997,540 sleeping and parlor car surcharge.

c Includes \$2,821,337 sleeping and parlor car surcharge.

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

d Deficit or other reverse items.

e Includes \$11,376,937 sleeping and parlor car surcharge.

f Includes \$11,097,937 sleeping and parlor car surcharge.

Time, due at New York 5:05 p. m., Eastern Time; traveling time 32 hours, 5 minutes.

The rate of postage for all matter carried on these planes will be 8 cents an ounce for each of the three sections into which the line is divided; New York and Chicago; Chicago and Cheyenne, Cheyenne and San Francisco; or a total of 24 cents an ounce through. Letters prepaid at these rates may be mailed at any post office, arrangements having been made to transmit them promptly to the nearest point at which they can be delivered to the aeroplane (namely, New York, Cleveland, Chicago, Omaha, Cheyenne, Salt Lake City, San Francisco). Parcels may be carried in the aeroplane up to a weight of 50 pounds, but everything must pay the letter rate. Special aeroplane stamps are to be issued, but any postage stamps may be used.

Canadian Court Decides American Arch Co. Case

The Superior Court of the Province of Quebec, District of Montreal, in an opinion rendered by Justice Duclos in the case of the American Arch Company vs. the Canuck Supply Company, Ltd., has held that the defendant company has infringed the Canadian patents of the plaintiff company. Justice Duclos issued a permanent injunction enjoining and restraining the Canuck Supply Company, Ltd., the Canadian Fire Brick Company, and their officers, agents and employees from further infringing the patents in question and also ordered an accounting of all the profits made by the defendant by the use of the invention in question since February 10, 1920.

Justice Duclos set forth in his opinion that from 1912 to February 10, 1920, the Canuck Supply Company, Ltd., acted as the representative of the American Arch Company for the sale and installation of the American Arch Company's fire arches in Canada. The Canuck Supply Company, Ltd., cancelled its contract with the American Arch Company effective February 10, 1920. In the correspondence regarding the reason for the cancellation of the contract, the Canuck Supply Company, Ltd., said in a letter, dated October 23, 1919, that it had taken up the question of the renewal of the arch contract with the purchasing and motive power departments of the Grand Trunk Railway and had been advised that the railway was not ready to go into the matter of renewing the contract. In his opinion Justice Duclos made the following statement: "The Grand Trunk Railway did not renew its contract with the plaintiff and the reason for this is not far to seek. Four of the directors of the Canuck Supply Company, Ltd., namely W. H. Robb, J. D. Robb, J. B. Robb, and W. C. Robb, are the sons of W. D. Robb, vice-president of the Canadian railway."

In the litigation the Canuck Supply Company, Ltd., undertook to show that the arches of the American Arch Company were not patentable and, further, that the rights and privileges granted by the patent in Canada had ceased to exist because at the end of two years from date thereof the patentee and his legal representatives did not commence and thereafter carry on continuously in Canada the construction or manufacture of the invention patented in such a manner that any person desiring to use it could obtain it, and because after the expiration of 12 months from the granting of the patent, the patentees imported into Canada the invention for which the patent was granted. Justice Duclos in his opinion fully upheld the patents of the American Arch Company in Canada, concurring fully in the decision of Justice Mack of the District Court of the United States, later affirmed by the Circuit Court of Appeals, which established the validity of the United States patent. Speaking on the question of importation and non-manufacture, Justice Duclos said that "The invention covered and claimed by the patent is a combination of known elements consisting of a locomotive fire box, side plates, circulation tubes and rows of fire bricks, specially constructed for the purpose and put together in such a manner as to attain the desired result. The importation of any one or more of these elements is not an importation of the invention. In fact, an invention of this kind, like a process patent, is not susceptible of importation within the meaning of the Patent Act. . . . What has been said in regard to importation is applicable to non-manufacture. The invention in question, strictly speaking, cannot be manufactured. All the patentee can do is to practice the invention or allow the others to practice the same."

The justice also found that "the said defendants and each of them have infringed and are continuing to infringe the invention covered by the said Letters Patent."

Traffic News

The Chicago & North Western has established through sleeping car service between Chicago and Lincoln, Nebr. The car leaves Chicago at 6:05 p. m. and arrives at Lincoln at 10:05 a. m. Returning, leave Lincoln at 4 p. m. and arrive at Chicago at 7:25 a. m.

The Long Island Railroad announces that tariffs have been filed with the New York State commissions providing for an advance on July 25 of 20 per cent in commutation tickets to and from New York. It is understood that the State authorities will suspend the tariff, pending a hearing.

At the icing station of the Chicago, Rock Island & Pacific at Topeka, Kans., on June 17, 740 tons of ice was put into 565 cars of cantaloupes in 24 hours. Forty-seven men did the work. The average time per car was 55 seconds, including the time required for spotting cars, as compared with 1 min. and 45 sec. per car, the best previous record. The icing platforms accommodate 15 cars at a time. Thus far this season 177 trains have been iced at Topeka and only four have reached Kansas City behind time.

C. N. R. Has Been Successful in Securing Employees' Aid in Traffic Solicitation

Sir Henry Thornton, president of the Canadian National, stated to the House Committee on National Railways and Shipping at Ottawa on Monday of this week that certain increases in freight business of the system shown in the annual report were due to a considerable extent to the response on the part of the rank and file of the company in soliciting freight business, quite apart from the freight department. The recent declining revenue on American lines of the Canadian National System was due to the fact that this was a Presidential year in the United States and business was marking time and the apparent over-production in the American automobile industry. The revenue on American lines should improve about the first of next month. Regarding freight rates Sir Henry said he would not want to see any charge that would strangle industry. Canadian rates were now lower than the American rates, but if Canadian rates were made still lower they would increase the deficit on the system. He stated, too, that if the Crow's Nest Pass Agreement regarding rates in Western Canada on certain commodities were restored to its full effect it would affect the whole freight rate structure in the entire Dominion of Canada.



Keystone

C. & N. W. Coach Yard, Chicago

Commission and Court News

Interstate Commerce Commission

The commission has issued a decision finding not justified the increased rates on lignite from mines in North Dakota to destinations in North Dakota, South Dakota and Minnesota, proposed by the railroads to become effective on December 6, 1923, suspended by the commission until April 4, and then later voluntarily postponed by the railroads to August 1. After an investigation and hearings the commission finds that the railroads have not justified the schedules proposed but that the present rates are too low. However, the record is held insufficient to determine specifically proper rates for the future and the commission submits to the parties a scale of rates suggested by the examiner in the case and offers an opportunity for them to confer on that or some other scale.

Southern Pacific Allowed to Reduce

Rates from New York Piers

The Interstate Commerce Commission has issued a decision finding justified reductions in carload commodity freight rates published in about 115 tariff items covering a varied list of articles from the New York piers of the Southern Pacific-Atlantic Steamship Lines (Morgan Line), applying by water to Galveston, Tex., or New Orleans, La., thence by rail to points on the lines of the Southern Pacific in New Mexico, Arizona and California. It has vacated the suspension of these rates, which were proposed by the company to become effective in October and November, 1923, but were suspended, on protest of the Atchison, Topeka & Santa Fe, the Western Pacific, the Chicago Association of Commerce, the Chicago Shippers' Conference Association and others, and then voluntarily postponed until August 1. The commission ordered cancelled one of the items purporting to name a rate from the New York piers of the Mallory Steamship Company and the Philadelphia piers of the Southern Steamship Company, said to have been inserted through error of the publishing agent, and it dismissed a complaint filed by the Chicago Association of Commerce which attacked the existing rates of the Sunset-Gulf route from New York piers. The commission said that the rate adjustment proposed appears to be a step in the direction of securing, as between the water carriers, a more equitable distribution of the available traffic, and as such its tendency will be toward attaining the ends designed by the law. Commissioners Campbell, McChord and McManamy dissented.

State Commissions

Frank B. Carvell, chairman of the Dominion Board of Railway Commissioners, has issued an order directing the Canadian Pacific Railway to install electric lights in the classification and marker lamps of all locomotive engines in the service of the company which are now or in future may be equipped with electric light installations, all engines put in service in the future with electric light installations to have the electric light installed in the classification and marker lamps before entering the service, and all engines now in the service and so equipped to have electric lights placed in the classification and marker lamps not later than December 31, 1925. This case arose out of an application by the Brotherhood of Locomotive Engineers and the Brotherhood of Locomotive Firemen and Enginemen asking for such an order.

Court News

Shipper Not Liable for Storage Charges

In an action by the carrier to recover from the shipper charges for storing merchandise for more than six months after transportation ended, on the claim that the storage was a mere incident to the transportation, the Circuit Court of Appeals, Ninth Circuit,

affirmed judgment for the defendant, it appearing that the merchandise was unloaded at the request of the owner, then part of it reloaded and shipped at his request, and the carrier held the merchandise removed from the remaining car for more than six months to enable the owner to dispose of it. The court said that if the carrier was holding the merchandise for and at the expense of the shipper, it was its duty to minimize the loss and sell the property at the earliest opportunity. As it was, the owner alone was responsible for the storage charges.—*Davis v. Adams*, 293 Fed. 890.

Average Agreement as to Demurrage Charges

Under the rule established by the Interstate Commerce Commission, the Ohio Supreme Court holds that demurrage charges for the detention of cars must be exacted and collected by the carrier in accordance with the tariffs on file, and where certain exceptions or exemptions are specified therein, no others can be permitted. The validity of this rule is not open to question in state courts. An average agreement between a railroad and a consignee provided that the latter should not be entitled to the benefit of certain tariff exemptions, including detention caused by weather conditions preventing unloading, and bunching of cars in delivery due to the neglect of any railroad company. The consignee was held not excused from demurrage charges because of bunching due to weather conditions.—*Anthony Carlin Co. v. Hines (Ohio)*, 140 N. E. 99.

United States Supreme Court

Commission's Distribution of Coal Cars O. K.

Suit was brought in the federal district court for Southern West Virginia by the operators of coal mines served by two or more carriers, for convenience called "joint mines," against the Chesapeake & Ohio and the Virginian and the government, to enjoin the carriers from applying Rule 4 of Circular CS-31, Revised, for the distribution of coal cars and to set aside the order of the commission of December 11, 1922.

Rule 4 was established during federal control, and after having been discontinued in favor of the "150 per cent rate," was, on reconsideration by the commission, found reasonable in the order referred to. *Bell & Zoller Coal Co. v. B. & O. S. W.*, 74 I. C. C. 433. The railroads gave notice that they would put the rule in force again, whereupon the suit was brought.

Rule 4 provides: "Copies of orders for cars for a mine that is joint with any other carrier (steam, electric, or water) shall be filed with a designated representative of each such carrier. Such combinations must not exceed the gross daily rating of the mine." Under the rules, when a mine orders less than its rating, distribution to it is on the basis of its orders. The district court set aside the commission's order and rule 4, and enjoined the United States, the commission and the defendant carriers from restricting the rights of the joint mine operators. 293 Fed. 460. The United States, the commission and certain local mine operators appealed.

The Supreme Court of the United States holds:

1. That the district court had jurisdiction.

2. That the commission's order in favor of rule 4 was not so arbitrary and unreasonable as to exceed its powers in respect of car distribution and was not discriminatory as against operators of joint mines.

"The Interstate Commerce Act confers powers on the commission to regulate the distribution of cars. See Sections 1, 3, 15. And its jurisdiction over the subject is exclusive. The courts will not review determinations of the commission made within the scope of its powers.

"Under rule 4, * * * an operator of a joint mine may order from each carrier, but the total number of cars ordered may not exceed the gross daily rating of the mine. It may select the carrier which at the time has the better car supply and receive its pro rata share of that supply. * * * It may choose between the carriers to secure the service, connections and markets it desires to have. The contention that the order of the commission deprives operators of joint mines of their property without due process of law is without merit."

The district court's decree was reversed. *United States v. New River Co.* Opinion by Justice Butler. Decided June 9, 1924.

Labor News

Trackmen Ask for Time and Half

The Brotherhood of M. W. Employees and Shop Laborers on June 24 appeared before the Labor Board and asked for higher overtime rates on 20 roads; and announced that a similar demand would be made all over the country. The request is for time and one-half for the ninth and tenth hours and for all work done on Sundays and holidays; straight time instead of half time payment for time consumed when traveling to and from assignments outside of working hours, and double time after sixteen hours.

Western Wage Hearing Postponed

The hearing before the Railroad Labor Board of the dispute between the western railways and their enginemen over proposed increases in wages and changes in working rules, was adjourned indefinitely when representatives of the brotherhoods failed to appear before the board on June 20. Although representatives of the railroads, headed by W. M. Jeffers, general manager of the Union Pacific, were ready to present their case, failure of the brotherhood representatives to appear was not unexpected. Several weeks ago, in a wage dispute with the Buffalo, Rochester & Pittsburgh, Warren S. Stone, president of the Brotherhood of Locomotive Engineers, and D. B. Robertson, president of the Brotherhood of Locomotive Firemen & Enginemen, refused to come before the board. It was anticipated that they would refuse to appear in the present case since they have contended that the situation is not such as to warrant the intervention of the board. The Labor Board has not announced what future action it will take.

Hooper Condemns Unions' Political Interests

Warren S. Stone, president of the Brotherhood of Locomotive Engineers, and D. B. Robertson, president of the Brotherhood of Locomotive Firemen & Enginemen, were assailed for their "misguided political and socialistic activities" by Ben W. Hooper, chairman of the United States Railroad Labor Board in an open letter to the brotherhood executives this week. Stone and Robertson were also reprimanded by Mr. Hooper for their "habitual vilification of the United States courts" and their "abuse of the public press and news agencies."

Mr. Hooper's letter was in reply to a personal attack on him which Stone and Robertson made in refusing to appear before the board in a dispute with the Buffalo, Rochester & Pittsburgh. In regard to the political activities of the brotherhoods, Mr. Hooper said:

"Your public activities are along two entirely separate and distinct lines. In the first place, you are the heads of labor organizations composed of a large number of railway employees. In the second place, you are among the leaders of a political movement in which you are attempting to deliver railway employees into an alliance with socialism. Because I have on certain public occasions expressed my antagonism to the socialistic political movement with which you are identified without ever having mentioned you or anybody else by name, you have seen fit to pretend that my attitude on the Railroad Labor Board is one of 'prejudice and antagonism to the official representatives of the employees and to the policies of their organizations.' If you mean by this that my attitude as a citizen is antagonistic to your political designs, you are entirely correct. If you mean that my attitude as an official is antagonistic to railway employees in connection with their industrial welfare, your statement is refuted by my record as a member of the board."

Mr. Hooper declared that he would be unfit for membership on the Labor Board if he were incapable of "drawing a line of distinction between Warren S. Stone, grand chief of the Brotherhood of Locomotive Engineers, and Warren S. Stone, the chief mogul of the so-called Conference for Progressive Political Action, comprising in its delegated membership seven representatives of the Socialist party."

Equipment and Supplies

Locomotives

THE ERIE has under consideration the question of buying 2 locomotives for passenger service.

THE CHICAGO, ROCK ISLAND & PACIFIC has ordered 1 Pacific type locomotive from the American Locomotive Company.

THE COLOMBIAN GOVERNMENT has ordered for the Ferrocarril del Pacifico 2 Mikado type locomotives from the American Locomotive Company.

THE ULEN CONTRACTING COMPANY, New York, has ordered 1 Mikado type locomotive from the American Locomotive Company for the Villazon Atocha Railway, South America.

THE NEW YORK CENTRAL is inquiring for 30 Pacific type locomotives and 25, 0-8-0 switching type locomotives. This company has renewed its inquiry for electric locomotives and is now asking for prices on from 2 to 30 electric locomotives.

Freight Cars

THE WESTERN FRUIT EXPRESS is inquiring for 1,000 underframes.

THE CARNEGIE STEEL COMPANY is inquiring for 10 steel gondola cars of 70 tons' capacity.

THE DENVER & RIO GRANDE WESTERN has ordered 32 automobile cars from the Pennsylvania Car Company.

THE INTERNATIONAL RAILWAYS OF CENTRAL AMERICA are inquiring through the car builders for 36 box cars.

THE CENTRAL OF VERMONT has ordered 12 underframes for caboose cars from the American Car & Foundry Co.

THE MAGNOLIA PETROLEUM COMPANY has ordered 50 insulated tank cars of 10,000 gal. capacity from the American Car & Foundry Co.

THE FLORIDA EAST COAST, reported in the *Railway Age* of May 10 as inquiring for 100 ballast cars, has ordered this equipment from the Rodger Ballast Car Company.

THE DELAWARE, LACKAWANNA & WESTERN, reported in the *Railway Age* of May 24 as inquiring for 40 caboose cars, has ordered this equipment from the Mt. Vernon Car Manufacturing Company.

THE DETROIT EDISON COMPANY, reported in the *Railway Age* of May 10 as inquiring for 12 all steel hopper cars, has ordered 20 hopper cars of 50 tons' capacity from the Pressed Steel Car Company.

THE SANDY VALLEY & ELKHORN, reported in the *Railway Age* of May 31 as asking for prices on repairing 500 hopper cars, has given a contract to the Youngstown Steel Car Company, Niles, Ohio, for the repair of 1,000 all steel hopper cars.

Passenger Cars

THE ILLINOIS CENTRAL is reported to be inquiring for prices on 130 motor cars and 130 trailers.

THE RIO GRANDE DO SUL, BRAZIL, is inquiring through the car builders for a number of passenger cars.

THE PENNSYLVANIA RAILROAD has given an order to the J. G. Brill Company for 1 "Model 55" gasoline car.

THE CENTRAL RAILWAY OF BRAZIL has ordered 6 first class passenger cars from the American Car & Foundry Co.

THE DANSVILLE & MOUNT MORRIS has ordered from the Edwards Railway Motor Car Company one 50-passenger twin-engine motor car.

THE READING COMPANY is inquiring for from 40 to 70 steel suburban coaches; 10 to 20 combination coach and baggage cars, also 10, 63-ft. steel baggage cars.

THE WABASH, reported in the *Railway Age* of May 17 as inquiring for 10 baggage cars, 2 dining cars, 5 chair cars and 3 combination passenger and baggage cars, has ordered this equipment from the American Car & Foundry Co.

Iron and Steel

THE SOUTHERN RAILWAY will buy 150 tons of steel for a bridge.

THE ERIE is inquiring for 200 tons of steel for a bridge near Jamestown, N. Y.

THE READING COMPANY has received bids for 300 tons of steel for a bridge at Wyomissing, Pa.

THE CENTRAL OF NEW JERSEY has let a contract for 150 tons of steel for its Elizabethport shops.

THE CHESAPEAKE & OHIO has let a contract for 300 tons of steel for a bridge at Clifton Forge, Va.

THE NORFOLK & WESTERN has given a contract to the Virginia Bridge & Iron Co. for 150 tons of steel for a bridge.

THE FLORIDA EAST COAST has ordered 3,500 tons of 90-lb. rail from the Tennessee Coal, Iron & Railroad Co.

THE DELAWARE, LACKAWANNA & WESTERN has given a contract to the American Bridge Company for 300 tons of steel for a bridge.

Machinery and Tools

THE PENNSYLVANIA RAILROAD has placed an order for a 102-in. tire mill.

THE MISSOURI PACIFIC has placed an order for two, 100-ton bushing presses.

THE ST. LOUIS-SAN FRANCISCO has placed an order for a 2,000-lb. steam hammer.

THE BANGOR & AROOSTOOK has placed an order for a 15-ton, 57 ft. span traveling crane.

MITSUI & COMPANY, New York, are inquiring for from 100 to 200 machine tools, to include heavy boring mills, planers and milling machines.

THE UNION PACIFIC has placed orders for a 90-in. quartering machine; 5-ft. radial drill; an axle lathe; 42-in. by 18-ft. lathe; 36-in. by 14-ft. planer and a 10 in. double cutting off and centering machine.

Signaling

THE NEW YORK CENTRAL has ordered from the General Railway Signal Company an electric interlocking, 72 working levers, for installation at West Seneca, N. Y., near Buffalo; also, a mechanical interlocking, 46 working levers, for Palatine Bridge, N. Y., and one of 10 working levers for Churchville Junction, N. Y.

THE LOUISVILLE & NASHVILLE has ordered from the General Railway Signal Company an electro mechanical interlocking for installation at Perritt, Ky.; four working mechanical levers and seven electric; also, an interlocking for Dolen, Ky., with four mechanical and five electrical levers; also, 25 semaphore signals for automatic signaling between the two points named.

THE UNION PACIFIC expects to open about September 1 the new 30-mile line from Boise, Idaho, to Orchard, which is now under construction. The new line in connection, with the branch line from Boise to Nampa, will provide Boise with main line instead of branch line service.

Supply Trade News

The Dearborn Chemical Company has removed its general offices in Chicago to 310 South Michigan avenue.

W. S. Boyce, representative of the Railroad Supply Company with headquarters at Chicago has been appointed assistant to the president in charge of sales, with the same headquarters.

C. K. Wehn, in charge of sales of the Blaw-Knox Company's standard steel buildings in the Pittsburgh, Pa., district, has in addition to his present duties been made assistant sales manager of the standard building department.

Beverly L. Worden, vice-president of the Cutler-Hammer Manufacturing Company, Milwaukee, Wis., has been elected president to succeed Frank R. Bacon, who has been elected



B. L. Worden

chairman of the board of directors. Mr. Worden was born at Chicago on February 8, 1871, and graduated from the University of Wisconsin in 1892. In the same year he entered the employ of the Wisconsin Bridge & Iron Company, Milwaukee, Wis., where he was employed in various capacities until 1902. He resigned from the Wisconsin Bridge & Iron Company on that date to become associated with the Worden-Allen Company, Milwaukee. In 1912 he founded the Lackawanna Bridge Company,

Buffalo, N. Y., but still retained the presidency of the Worden-Allen Company. A few years later he purchased the Ferguson Steel & Iron Corporation, Buffalo, N. Y. In 1917 Mr. Worden was in charge of the construction of the Submarine Bolt Corporation's shipyards at Newark, N. J., and later directed the construction of 150 steel ships for war emergency use. He is still connected with the Submarine Bolt Corporation. In 1922 he became president of the Beaver Board Company, an affiliated company, and still holds that position. He became vice-president of the Cutler-Hammer Manufacturing Company in March, 1923, which position he has held until his recent promotion.

Philip S. Westcott, formerly assistant car lighting engineer of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago, has been appointed special representative for the Pyle-National Company, with headquarters at Chicago.

Harvey T. Gracely, advertising manager of the Marion Steam Shovel Company, Marion, Ohio, has been promoted to assistant sales manager. Clarence E. Silva, formerly in the engineering department, has been promoted to advertising manager to succeed Mr. Gracely.

K. A. Hills, representative of the General Electric Company at Davenport, Ia., has been promoted to manager, with the same headquarters. S. E. Gates, manager of the Spokane, Wash., office, has been transferred to Los Angeles, Cal., and will be succeeded by Bernhard Olsen.

The Gibb Instrument Company, Bay City, Mich., on July 1 will place W. F. Hebard & Company, 551 W. Van Buren street in charge of its Chicago office. Thomas Barnes will head the welding department and will be assisted by Charles Watson. E. S. Hurd, who has represented the Gibb

Instrument Company in Chicago for the past five years has been transferred to the New England territory, effective August 1.

William T. Ruete, an inventor and an authority on interior conduit, died on June 7 in New York City. At the time of his death he was consulting engineer of the conduit and wire division of the General Electric Company, Schenectady, N. Y. Mr. Ruete was identified with E. T. Greenfield in the development of interior conduit.

Donald W. Kingsley, assistant manager of **S. F. Bowser & Co.**, with headquarters at Dallas, Tex., has been promoted to manager of the Detroit office. **Paul W. Lawcher**, of the Ft. Wayne sales division, has been promoted to manager of the new Memphis office. **E. E. Springer**, district manager, with headquarters at Atlanta, Ga., has been promoted to manager of the new Birmingham, Ala., office. **E. B. French**, manager of the Atlanta office, has been promoted to sales superintendent, with headquarters at Washington, D. C., and will be succeeded by **H. C. Carpenter**, of the Atlanta office. **R. S. Caldwell**, assistant sales manager, with headquarters at Ft. Wayne, Ind., has been promoted to manager of the Philadelphia division. This company has completed the construction of a new two-story building with approximately 20,000 sq. ft. of floor space at San Francisco, Cal., which will be used as the headquarters of the branch office and warehouse.

The plant, equipment and good will of the Norwalk Iron Works Company, Norwalk, Conn., was sold recently to Charles B. Stanley, a member of the Cleveland banking firm of Stanley & Bissell. Immediately following the purchase, Mr. Bissell transferred the properties to a new corporation, the **Norwalk Company**. The directors of the new corporation are **Charles B. Stanley**, **Howard N. Bissell** and **George F. Griffith** of Cleveland; **F. R. Hickman** and **E. H. Havens** of Bridgeport; and **R. C. Witmer** and **T. H. Hermanson** of Norwalk. These directors, organized with E. H. Havens as president; F. R. Hickman, vice-president and treasurer; R. C. Witmer, secretary and T. H. Hermanson, works manager. The Norwalk Iron Works Company was incorporated in 1867 to build engines and compression machinery. The new company will continue the Norwalk plant along existing lines, with a general broadening of its output, to include the complete range of air and gas compressors, and a further development of its service of machines already in the field.

Pullman Company Separates Activities

In accordance with plans for the segregation of the sleeping car and manufacturing operations of the Pullman Company, the Pullman Car & Manufacturing Company has been organized with a capital stock of \$50,000,000 to take over the entire business and operations conducted by the manufacturing department of the Pullman Company in its plants at Pullman (Chicago), Ill., and Michigan City, Ind. The capital stock, which will be held in the treasury of the Pullman Company, represents the appraised value of the manufacturing properties. Officers of the new company are: President and treasurer, **D. A. Crawford**, formerly vice-president and assistant to the president of the Pullman Company; vice-president, **Clive Runnells**, formerly a vice-president of the Pullman Company; vice-president, **C. A. Liddle**, formerly a vice-president of the Pullman Company; and secretary, **S. W. Gehr**, formerly attorney



D. A. Crawford

for the Pullman Company. Mr. Crawford was born in St. Louis, Mo., on April 1, 1880, and graduated from the University of Wisconsin in 1905. After serving for two years as an instructor at the university he was appointed secretary to E. F. Cary, vice-president of the American Car & Foundry Company. Five years later he was elected assistant secretary of the company and on January 13, 1916, he was elected treasurer of the Haskell & Barker Car Company. He held the latter position until the consolidation of the Haskell & Barker Car and Pullman companies on January 14, 1922, when he was elected a vice-president of the Pullman Company, which position he held until his recent election. Mr. Runnells was born in Des Moines, Ia., on September 10, 1877, and graduated from Harvard University in 1900. He entered the employ of the Chicago Junction Railway Company in the same year and in 1904 entered the employ of the Pere Marquette as commercial agent, with headquarters at Chicago, which position he held until 1905, when he entered the employ of the Western Steel Car & Foundry Company. In 1907 he was made vice-president of McCord & Co., railway supplies, Chicago, and in 1910 he entered the employ of the American Car & Foundry Company, at Chicago. From 1911 to 1915 he was a partner in Babcock, Rushton & Co., stocks and bonds, and in 1915 he entered the employ of the Pullman Company as assistant to the president. He held this position until May, 1917, when he was promoted to vice-president and assistant to president, which position he has held until his recent advancement. Mr. Liddle entered business as an employee of the Allison Manufacturing Company, Philadelphia, Pa., and was later associated in turn with the Jackson & Sharp Company, the Harlan & Hollingsworth Company at Wilmington, Del., and the Pressed Steel Car Company, at Allegheny, Pa. In 1901 he entered the employ of the American Car & Foundry Company as an engineer and was later promoted to assistant to the vice-president and then to general manager, which position he resigned on January 1, 1916, to become vice-president of the Haskell & Barker Car Company. On January 14, 1922, he was elected a vice-president of the Pullman Company, which position he has held until the present reorganization.



C. A. Liddle



Clive Runnells

The authorized capital stock of the Westinghouse Electric & Manufacturing Company was increased from \$125,000,000 par value to \$200,000,000 par value at a meeting of the stockholders held June 11 at East Pittsburgh, Pa. A number of directors were re-elected and **L. A. Osborne** and **H. P. Davis** were elected new directors to fill vacancies created on the board by the retiring of James C. Bennett and William H. Woodin.

Railway Construction

ATCHISON, TOPEKA & SANTA FE.—This company has awarded a contract to Lundgren & Carlson, Topeka, Kan., for the construction of two brick lavatory buildings at Arkansas City, Kan., as reported in the *Railway Age* of June 14.

ATCHISON, TOPEKA & SANTA FE.—This company has awarded a contract to the Roberts & Schaefer Company, Chicago, for the construction of a 300-ton reinforced concrete locomotive coaling and sanding plant at Colorado Springs, Colo.

BALTIMORE & OHIO.—This company has awarded a contract to the Vang Construction Company, Cumberland, Md., for the construction of a bridge over the Pennsylvania Railroad, a creek and a highway at Snowden, Pa. The structure will consist of an 18-ft. arch and a 40-ft. arch. The Pennsylvania will participate in the cost of the work.

CANADIAN PACIFIC.—This company has awarded a contract to Rosen & Wickstrand, Regina, Sask., for the grading of the new line from Leader, Sask., to a point 25 miles east.

CHICAGO, BURLINGTON & QUINCY.—This company has awarded a contract to G. A. Johnson & Son, Chicago, for the construction of a new passenger station at Shenandoah, Ia., reported in the *Railway Age* of May 24.

CHICAGO & NORTH WESTERN.—This company will begin at once the construction of a bridge over its tracks at Folsom Place in Milwaukee, Wis., to abolish the grade crossing at that point.

CHICAGO, ROCK ISLAND & PACIFIC.—This company has completed surveys for the construction of a 3½-mile spur at Keosauqua, Ia.

CLEVELAND UNION TERMINAL.—This company is calling for bids for the construction of a retaining wall along Ontario street south of Public Square in Cleveland, Ohio, and for excavation in connection with the new Union Station. The retaining wall contract will call for approximately 225,000 yd. of excavation; about 240,000 lb. of steel sheet piling; the placing of some 6,000 yd. of concrete and about 800,000 lb. of reinforcement bars. The wall will be approximately 500 ft. long and 20 to 40 ft. in height. This project is a part of the terminal company's program calling for the expenditure of approximately \$10,000,000 this summer.

FLORIDA EAST COAST.—This company has authorized the construction of three 100-car capacity storage tracks with a lead track 15,837 ft. in length to connect with its yard at South Jacksonville, Fla., to cost approximately \$99,000.

GRAND TRUNK.—This company is calling for bids for the construction of a 350-ton reinforced concrete coaling station at Grand Haven, Mich.

GRAND TRUNK WESTERN.—This company has awarded a contract to Bierd, Lydon & Grandpre, Inc., Chicago, for the construction of the engine terminal at Battle Creek, Mich., reported in the *Railway Age* of May 17.

ILLINOIS CENTRAL.—This company has prepared plans for the construction of a subway for pedestrians under Michigan avenue at Van Buren street, in Chicago. The subway will be 18 ft. wide.

ILLINOIS CENTRAL.—This company has awarded a contract to the W. J. Zitterell Company, Webster City, Ia., for the construction of a new passenger station, five concrete viaducts and an over-head bridge at Paxton, Ill. The project is estimated to cost \$200,000.

KANSAS CITY SOUTHERN.—This company is reported to be making surveys for a branch line from Watts, Okla., to Grove, estimated to cost \$100,000.

LOUISVILLE & NASHVILLE.—This company has awarded a contract to the Roberts & Schaefer Company for an electrically operated cinder plant at Gentilly, La.

MISSOURI-KANSAS-TEXAS.—This company, jointly with the Missouri Pacific and the city of Nevada, Mo., is considering the con-

struction of a subway under the tracks at Walnut street in Nevada. The total estimated cost of \$225,000 is to be divided among the railways and the city.

MISSOURI PACIFIC.—This company has awarded a contract to Liston & Weatherly, St. Louis, Mo., for the construction of a three-mile spur track at Benton, Ill., reported in the *Railway Age* of June 14. This company is calling for bids for yard filling requiring approximately 100,000 cu. yd. of fill at Kansas City, Mo.

NORFOLK & WESTERN.—This company has authorized the construction of a freight station at Bluefield, W. Va., to cost approximately \$650,000; an oil house at Roanoke, Va., to cost approximately \$150,000; and station and track changes at Roxboro, N. C., at an approximate cost of \$63,000. Contracts have been awarded respectively to the Virginia Bridge & Iron Company and the American Bridge Company for steel work on two bridges in the Cincinnati district, the first involving an expenditure of \$18,650 and the second \$51,000. The firm of Sturm & Dillard has the contract for masonry work on the second project, Geo. W. Kane, Roxboro, N. C., has the contract for the station construction work at Roxboro. The company has authorized the construction of 9.5 miles of second track on its Big Sandy line—to cost approximately \$1,185,000—and H. M. Waugh has been awarded the contract for the grading.

READING.—This company has awarded a contract to Martin & Breen, Inc., Philadelphia, for the grading, masonry and waterproofing in connection with the reconstruction of a bridge over Tobickon creek, north of Shelly, Pa., on its Bethlehem branch.

READING.—This company has, in connection with the high tension electric line work under construction on the Atlantic City Railroad, as part of its automatic train control installation, awarded a contract to the Curtis-Grindrod Company, Philadelphia, for the construction of sub-station buildings at Hammonton and Atlantic City.

ST. LOUIS-SAN FRANCISCO.—This company is calling for bids for the construction of a stucco passenger station at Sikeston, Mo.

SEABOARD AIR LINE.—This company has awarded a contract to the MacDougald Construction Company, Atlanta, Ga., for the filling in of a trestle at Dallas, Ga. The work will include the construction of reinforced box culverts.

SOUTHERN.—This company has awarded a contract for the construction of modern shop facilities for the repair of freight and passenger cars at Hayne, S. C., near Spartanburg, to Dwight P. Robinson, Inc. The buildings will all be of masonry and steel construction with modern arrangements for heating, lighting and ventilation, and new machinery will be installed. The following buildings will be erected: Steel freight car repair shop of fireproof construction, 390 ft. by 108 ft., equipped with electrically operated traveling cranes and served by five tracks; annex machine shop, 130 ft. by 50 ft.; coach shop of masonry and steel frame, 240 ft. by 180 ft.; coach paint shop, 200 ft. by 200 ft., with two-story annex for upholstery and other work, 120 ft. by 40 ft.; the coach and paint shop will each be served by ten tracks and by a transfer table of 80 ft. span in a pit 160 ft. long; storehouse and office, 140 ft. by 55 ft.; wash and locker house for employees, 105 ft. by 35 ft.; wheel shop, 105 ft. by 55 ft.; smith shop, 160 ft., by 100 ft.; planing mill, 160 ft. by 100 ft.; power house, 90 ft. by 50 ft.; oil house, 40 ft. by 25 ft.; dry kiln, 40 ft. by 20 ft.; dry lumber shed, 75 ft. by 25 ft.; scrap dock, 400 ft. by 52 ft.; reclaiming shop, 60 ft. by 35 ft.; a service crane with 60 ft. span in a runway 760 ft. long will be located so as to serve the steel car shop, the smith shop and the wheel shop. Approximately 10 miles of track will be constructed in connection with the plant which will be located on a slight grade from north to south so that bad-order cars, brought in from the north end, can be moved practically by gravity entirely through the shop. It is expected that work on the plant will begin as soon as men and materials can be assembled.

ST. LOUIS-SAN FRANCISCO.—This company contemplates the construction of a new hospital at Springfield, Mo., at an estimated cost of \$500,000.

TEXAS & PACIFIC.—This company is reported to be planning the construction of a yard and roundhouse at Shreveport, La., at an estimated cost of \$1,000,000.

Railway Financial News

BOSTON & MAINE.—Directors Upheld.—In an equity suit brought by Edmund D. Codman to hold Frederick C. Dumaine and others, directors of the Boston & Maine, responsible for the amount of an advance of \$240,000 to the Hampden Railroad, which advance, averred Mr. Codman, the directors never tried to collect, the Massachusetts Supreme Court holds that there are no allegations which can support liability on the part of any one of the defendants. The bill was ordered dismissed with costs.

CHICAGO, BURLINGTON & QUINCY.—New Directors.—Stephen Birch, Walker D. Hines, E. P. Bracken, vice-president in charge of operations, and Conrad E. Spens, traffic vice-president, have been elected to the board. Stockholders recently authorized increase in the directorate from 13 to 17.

CHICAGO & NORTH WESTERN.—Bonds Sold.—Kuhn, Loeb & Co. have placed privately \$3,150,000 general mortgage 5 per cent gold bonds, due November 1, 1987.

CHICAGO, MILWAUKEE & ST. PAUL.—Annual Report.—This company's annual report for 1923 is reviewed in an article on another page of this issue entitled "Milwaukee Earns Charges With Narrow Margin." See also excerpts from annual report on adjacent page.

CHICAGO, ROCK ISLAND & PACIFIC.—Notes Sold.—Speyer & Co. and Dillon, Read & Co. have sold, subject to the approval of the Interstate Commerce Commission, \$10,000,000 five-year 5 per cent secured notes at 99 and interest, to yield over 5.20 per cent.

EL PASO & SOUTHWESTERN.—Acquisition by S. P.—Walter Douglas, president of the Phelps-Dodge Corporation, which owns the El Paso & Southwestern, explained some of the features of the proposed amalgamation of that line with the Southern Pacific, in the following statement:

This is not a sale of the El Paso & Southwestern interests in any sense. It is purely a partnership. The Southwestern interests will have three directors on the Southern Pacific board and two members of the executive committee. The Southern Pacific directorate is composed of 15 persons, but of that number there are only 12 owners, so our three directors will represent 25 per cent of the owners.

We were faced with the probability of mandatory consolidation. In view of that situation, we felt that our interests in group 17, which consists of the Southern Pacific, Rock Island and El Paso & Southwestern systems, would not be very material if the forced consolidation under the federal plan came about. Compared to the 12,000 miles of main line in each of the other two systems, we would be pretty small fry. We felt that we would get a very much better representation through a voluntary partnership.

The three principal conditions are:

1. Adequate representation on the Southern Pacific board. The Southwestern interest's block of stock not only will be the largest individual block, but is the largest of any block in any transcontinental railway company in the entire country.

2. A joint agreement to construct a \$10,000,000 main line railroad through the Salt River valley of Arizona immediately after the partnership becomes effective.

3. The assumption by the Southern Pacific company of our pension system and seniority rights of our employees.

Operating and shop forces in El Paso will be materially increased, but clerical forces probably will be reduced. Owners of the system will be more than anxious to retain many of the officials of the Southwestern system.

Those are the things that will be worked out after approval of the proposition is received from the Interstate Commerce Commission. The commission goes on vacation at the end of July, and will not reconvene until October. Action in this matter will depend largely on the force of representations to them to act quickly. If approved quickly, this is going to have the effect of creating a very different sentiment throughout the southwest.

My anticipation is that a very much greater volume of freight will be moved through El Paso. This will come from points on the Missouri river and the Pacific Coast, which now ship by northern routes. Freight business also will be created through the construction of the 300-mile main line through the Salt River valley, which will open up one of the biggest freight making districts in the United States.

With the construction of the San Carlos dam, which will open up 200,000 acres for cultivation, at a cost of \$6,000,000 and the new main line railroad, which will cost \$10,000,000, conditions in the southwest will improve. Expenditure of \$16,000,000 in the southwest is something that we need right now.

ERIE.—Bonds.—This company has been authorized by the Interstate Commerce Commission to pledge and repledge from time to time \$17,217,000 of first consolidated mortgage general lien 4 per cent bonds and \$8,812,000 of general mortgage 4 per cent convertible 50-year bonds as collateral for short term notes.

ERIE.—Control by Van Sweringens Reported.—It can be stated authoritatively, according to the Wall Street Journal, that the Van Sweringen interests of Cleveland have secured sufficient Erie stock practically to give them control and that they have recently turned to the Pere Marquette with a view of securing this property as well.

This is the second important step in the formation of a great 10,000 mile railroad system, to be known presumably as the "Nickel Plate System," comprising the consolidated New York, Chicago & St. Louis, Chesapeake & Ohio, Erie, Pere Marquette with the possible inclusion of the Virginian and Pittsburgh & West Virginia, which has been completed, with the virtual acquisition of Erie control by the Van Sweringen interests of Cleveland. The first move was assumption of control of the Chesapeake & Ohio by the Nickel Plate in February last year.

FLORIDA EAST COAST.—Equipment Trust Certificates.—This company has applied to the Interstate Commerce Commission for authority to issue \$1,875,000 of 5 per cent equipment trust certificates to be sold to J. P. Morgan & Co., at 97.56.

GRAND RAPIDS, HOLLAND & CHICAGO.—Receivership.—Steward Hantey, of Detroit, has been named receiver.

GREAT NORTHERN.—Equipment Trust Certificates.—The Interstate Commerce Commission has authorized this company to assume obligation and liability in respect of \$4,400,000 of Western Fruit Express Company equipment trust certificates.

LARAMIE, NORTH FORK & WESTERN.—New Name.—See Northern, Colorado & Eastern.

LEHIGH & NEW ENGLAND.—Bonds.—This company has applied to the Interstate Commerce Commission for authority to issue and sell \$2,000,000 of general mortgage 5 per cent gold bonds to reimburse the treasury for expenditures for additions and betterments.

LOUISIANA RAILWAY & NAVIGATION COMPANY OF TEXAS.—Securities.—This company has been authorized by the Interstate Commerce Commission to issue \$400,000 of common stock and \$750,000 of first mortgage 6 per cent bonds; \$52,000 of the stock to be sold for cash and \$247,000 of the stock and all of the bonds to be delivered to William Edenborn in payment for the property of the Sherman, Shreveport & Southern.

MINNEAPOLIS & ST. LOUIS.—Abandonment.—The receiver has applied to the Interstate Commerce Commission for authority to dismantle and abandon its line from Akaska to Le Beau, S. D.

MICHIGAN CENTRAL.—Annual Report.—This company's annual report for 1923 is reviewed in an article on another page of this issue entitled "Michigan Central Breaks Previous Record." See also excerpts from annual report on adjacent pages.

MISSOURI PACIFIC.—Notes Sold.—Kuhn, Loeb & Co. have sold, subject to the approval of the Interstate Commerce Commission, \$12,000,000 three-year 5 per cent notes at 99¼ to yield over 5.27 per cent. The proceeds of this issue of notes will be used to reimburse the company in part for expenditures, not heretofore capitalized by it, made for improvements and betterments upon the properties, subject to its first and refunding mortgage, and for the retirement of underlying obligations. Such capital expenditures have amounted to more than \$28,000,000 since December 31, 1920.

NORFOLK & WESTERN.—Lease Postponed.—See Pennsylvania.

NORTHERN, COLORADO & EASTERN.—Change in Name.—Directors of the Northern, Colorado & Eastern have voted to change the name of the railroad to Laramie, North Fork & Western. The line extends from Laramie, Wyo., to Coalmont, Colo.

PENNSYLVANIA.—N. & W. Lease.—A statement given out on Wednesday by President Samuel Rea says:

"The committee appointed by the Pennsylvania Railroad to consider the lease of the Norfolk & Western reported to the directors that it had not reached any satisfactory conclusion on the subject and that further consideration of the matter should be deferred."

READING.—Preferred Dividends.—Answer was filed in U. S. District Court at Philadelphia by preferred stockholders to the contempt suit brought against them by the company following their motion in asking the Court of Common Pleas to restrain

(Continued on page 1849)

Annual Reports

Fifty-ninth Annual Report of the Chicago, Milwaukee & St. Paul Ry. Co.

The Directors submit to the Stockholders the following report of the operations of the Company for the year ended December 31, 1923:

INCOME ACCOUNT.

RAILWAY OPERATING INCOME:	
Railway operating revenues.....	\$169,628,337.77
Railway operating expenses.....	134,999,227.81
Net railway operating revenue.....	34,629,109.96
Railway tax accruals.....	\$8,614,179.73
Uncollectible railway revenues.....	3,111.83
	8,617,291.56
Railway operating income.....	\$26,011,818.40
Equipment rents.....	\$4,400,583.66
Joint facility rents.....	1,443,521.73
	5,844,105.39
Net railway operating income.....	\$20,167,713.01
NON OPERATING INCOME:	
Rents received—Other.....	\$743,087.42
Income from lease of road.....	339,939.06
Dividends on stocks.....	22,778.83
Interest on bonds.....	36,058.11
Interest on other securities and accounts.....	184,909.41
Miscellaneous income.....	384,222.78
	1,710,995.61
Net railway and non operating income.....	\$21,878,708.62
DEDUCTIONS:	
Interest on funded debt.....	\$19,443,502.79
Interest on unfunded debt.....	586,161.07
Rents paid—Lease of road.....	947,229.65
Rents paid—Other.....	61,283.67
Miscellaneous.....	632,845.34
	21,671,022.52
NET INCOME.....	\$207,686.10

GENERAL STATEMENT.

The result of operations of your company for the year ended December 31, 1923, shows a surplus above requirements for interest of \$207,686, as compared with a deficit of \$6,143,168 for the year ended December 31, 1922, and as compared with a deficit of \$11,070,608 for the year ended December 31, 1921.

For the first time since December 31, 1917, the operations have yielded an income sufficient to meet interest obligations, and while the income is insufficient for a dividend to stockholders, yet the improvement in net earnings since the end of Federal Control and the substantial gain over previous years indicates continuing progress.

While the gross revenue for the year ended December 31, 1923, shows an increase over the previous year, your company did not enjoy the same prosperity as railroads in some other sections of the country on account of unfavorable business conditions in some parts of the territory it serves, and also on account of its inability to make rates to the Pacific Coast to meet water competition through the Panama Canal. An application to correct the latter situation is now pending before the Interstate Commerce Commission.

The results accomplished during the year 1923 may be largely ascribed to the ability of your company to move additional business yielding additional gross revenue over the year 1922 of \$12,677,709 with an increase in transportation expenses of only \$477,609. One of the principal factors contributing to this result was a saving over 1922 prices of \$4,400,000 in the cost of fuel used in the year 1923, partly due to the high cost of fuel in 1922, and partly to advantages derived from the acquisition of the Chicago, Terre Haute & Southeastern Railway from which territory the major portion of the fuel supply is now procured.

The physical condition of the property and equipment has been maintained and materially improved during the year and the company was able to furnish equipment for and move promptly all traffic available during the year.

ADDITIONS AND BETTERMENTS.

EQUIPMENT:

Delivery was made in 1923 of 573 40-ton steel frame box cars and 247 40-ton steel frame automobile cars, completing the order authorized and placed in 1922. During the current year purchase was authorized of 75 Mikado type locomotives, 2,000 40-ton steel frame box cars, 500 40-ton steel frame automobile cars, and 5,000 50-ton steel frame gondola cars. All of this equipment was delivered except the 500 automobile cars. One sample stock car of 30-ton capacity was constructed by company forces. Equipment rebuilding accounted for during 1923, included 73 steam locomotives, 10 refrigerator cars, 575 box cars, 486 coal cars, 3 units of passenger equipment, and one company service car. The conversion of locomotives from compound to simple type mentioned in the 1922 report, as authorized, but incomplete, was completed in 1923. These locomotives were accounted for as rebuilt and are included in the total of 73 before mentioned.

TRACKS:

The principal items of track work during the year include the construction of a line of railroad extending from a connection with the existing line near St. Clair Street in a general southwesterly direction to a connection with the proposed tracks of the Ford Motor Company, a distance of 4.45 miles, and a 200-car yard near West Seventh Street, all within the City of St. Paul, Minnesota. This project involves also the construction of approximately .93 miles of double track spur off the new line to serve the Ford Motor Company, and 1,200 feet of side track to serve J. L. Shieley Company's Crusher.

Interchange tracks aggregating 4,000 feet in length have been constructed 2.5 miles west of Ontonagon, Michigan, to serve the logging operations of the Thompson Wells Lumber Company and the Menasha Wooden Ware Company.

Main line track improvements have been made to the extent of placing 33,171 gross tons of new 90-lb. and 100-lb. open hearth rail, replacing lighter rail.

Trackage which has been abandoned and accounted for consists of the following sections of main track: between Gratiot, Wisconsin and Warren,

Illinois, 6.43 miles; between Lynn, Wisconsin, and Romadka, Wisconsin, 5.23 miles; between Harlem, North Dakota, and Cogswell, North Dakota, 5.11 miles.

WATER STATIONS:

A new 450 foot well was drilled at Davis Junction, Illinois, to augment the present locomotive water supply. New test wells were drilled at Mar-mar, North Dakota, and Lemmon, South Dakota, and a new well and pumping plant was established at Faith, South Dakota, to replace the old well and wind-mill.

STATION AND OFFICE BUILDINGS:

A new 6-story addition 67' x 159' in dimensions, of reinforced concrete, fire proof construction; also a 3-story addition to the previously existing 3-story part of the Fullerton Avenue Office building has been constructed. This is to provide office space for some of the offices which are now located at various places within the loop district of the City of Chicago.

A new depot 30' x 71' of hollow tile and stucco construction, owned jointly with the C. & N. W. Ry. Co., was constructed at Milton Junction, Wisconsin; also a new depot 24' x 82' of frame construction on concrete foundation, at Kenyon, Minnesota; and a new depot 24' x 80' of hollow tile and stucco construction, at Lake City, Minnesota.

FREIGHT HANDLING FACILITIES:

Freight handling facilities in freight houses have been considerably improved during the past year by the purchase and installation of four tractors and 400 trailers for use at Galewood, Illinois, and two tractors and 90 trailers at Milwaukee, Wisconsin.

GRADE SEPARATION:

The elevation of the tracks on the Evanston line of the Chicago Terminals Division between Montrose Boulevard and Howard Street, Chicago, a distance of 4.4 miles, was completed during the year. This included everything called for in the track elevation ordinance.

Six new stations were put into service during the year: at Argyle Street and at Berwyn, Thorndale, Granville, Jarvis and Lawrence Avenues.

CHICAGO, TERRE HAUTE & SOUTHEASTERN RAILWAY.

EQUIPMENT:

Additional C. T. H. & S. E. equipment acquired, and existing C. T. H. & S. E. equipment rebuilt, the cost of which was advanced and accounted for by the C. M. & St. P. Ry. Co. during the current year, was as follows: Additional equipment—1 15-ton locomotive crane and clam shell bucket purchased, and 25 cabooses built by company forces.

Rebuilt equipment—2 steam locomotives, 2,355 coal cars, 1 caboose, 1 passenger and express car, and 1 company service car. Of the 2,355 coal cars rebuilt, 597 were rebuilt by the Keith Railway Equipment Co., 791 by the Illinois Car & Mfg. Co., and 967 by company forces.

TRACKS:

New construction of major importance includes the construction of 36.1 miles of second main track between Webster, Illinois, and Bradshaw, Indiana; a new connecting track with the Chicago, Milwaukee & Gary Railway 4.682 feet long at Delmar, Illinois, to permit the operation of trains from West Clinton, Indiana, to Joliet, Illinois, thereby saving transfer and switching charges on the New York Central at Delmar, Illinois; also a connecting track with the Toledo, Peoria and Western Railroad, 2,283 feet long, at Webster, Illinois, to provide interchange facilities. A new interlocking plant has been constructed at the Delmar, Illinois, crossing on account of the connecting track mentioned above crossing the main track of the New York Central Lines.

Additional tracks in West Clinton yards and tracks to the Linton Summit Mine at Hoosier, Indiana, mentioned in last year's report, were completed in 1923.

FUEL STATIONS:

A new mechanical coaling plant of the balanced bucket type of 200 tons storage capacity to deliver coal to engines on two main tracks, was authorized for construction at North Hooper, Illinois. This work has been 80% completed.

SHOP FACILITIES:

The machine shop and power house improvements at West Clinton, Indiana, mentioned in last year's report, were completed during the current year.

FEDERAL VALUATION.

During the past year the Interstate Commerce Commission served on this Company the Preliminary Engineering Report on physical property other than land, the Preliminary Land Report and the Preliminary Accounting Report, all of which reports are taken into consideration in fixing the tentative valuation. The Railway Company has filed replies to all of these reports, setting forth in detail our criticisms and objections, which will be given consideration before the tentative valuation is served. It is expected that the tentative valuation will be served during the latter part of the year 1924, that a formal hearing, based upon our protest to this tentative valuation, will be had early in the year 1925, and that the final valuation will probably be served during the latter part of the year 1925.

RESERVE FOR ACCRUED DEPRECIATION.

At the close of the fiscal year, ending December 31, 1922, there was at the credit of reserve for accrued depreciation, the sum of \$23,222,398.44.

A certain percentage of the total cost of equipment has been credited to this reserve for the estimated depreciation of locomotives, passenger train cars, freight train cars and work equipment, accrued during the year, which, together with other adjustments, aggregates \$3,566,139.46.

There has been charged to this reserve an amount of \$1,734,128.01, representing the accrued depreciation, previously credited, on locomotives and cars destroyed, sold or taken down during the year, and other adjustments, which results in a net increase in this reserve of \$1,832,011.45 for the year.

The balance of this reserve, December 31, 1923, as shown in the balance sheet is \$25,054,409.89, which represents the estimated depreciation of rolling stock from June 30, 1907, to December 31, 1923.

By order of the Board of Directors.

April, 1924.

H. E. BYRAM,
President.

[ADVERTISEMENT]

Michigan Central Railroad Company—Seventy-eighth Annual Report

To the Stockholders of

THE MICHIGAN CENTRAL RAILROAD COMPANY

The Board of Directors herewith submits its report for the year ended December 31, 1923, with statements showing the income account for the year and the financial condition of the company.

Maximum tonnage, operating revenues and net income

Previous records were broken by the performance for 1923 in the following respects, among others:

	Previous record year	Increase in 1923 over previous record year
Revenue tonnage	1920	7.02 per cent
Railway operating revenues	1920	7.98 per cent
Freight revenue	1922	15.11 per cent
Net income	1922	10.59 per cent

Passenger revenue was greater than in any previous year except 1920, having been 8.88 per cent less than in that year.

INCOME ACCOUNT FOR THE YEAR

	Year ended Dec. 31, 1923	Year ended Dec. 31, 1922	Increase or Decrease
OPERATING INCOME	1,862.67	1,862.06	.61
Railway operations	miles operated	miles operated	mile
Railway operating revenues	\$94,798,042.04	\$83,426,407.27	\$11,371,634.77
Railway operating expenses	67,639,531.88	59,576,357.37	8,063,174.51
Net revenue from railway operations	\$27,158,510.16	\$23,850,049.90	\$3,308,460.26
Percentage of expenses to revenues	(71.35)	(71.41)	—(.06)
Railway tax accruals	\$5,615,543.77	\$4,571,702.45	\$1,043,841.32
Uncollectible railway revenues	24,700.21*	13,497.68	—38,197.89
Railway operating income	\$21,567,666.60	\$19,264,849.77	\$2,302,816.83
Equipment rents, net debit	\$1,619,002.35	\$716,353.02	\$902,649.33
Joint facility rents, net debit	560,488.88	482,387.46	78,101.42
Net railway operating income	\$19,388,175.37	\$18,066,109.29	\$1,322,066.08
Miscellaneous operations			
Revenues	\$374,814.29	\$320,795.60	\$54,018.69
Expenses and taxes	310,004.32	179,713.48	130,290.84
Miscellaneous operating income	\$64,809.97	\$141,082.12	—\$76,272.15
Total operating income	\$19,452,985.34	\$18,207,191.41	\$1,245,793.93
NON-OPERATING INCOME			
Income from lease of road	\$75,086.71†	—\$75,086.71
Miscellaneous rent income	163,125.40	\$360,962.81	—197,837.41
Miscellaneous non-operating physical property	71,960.79	4,515.29	67,445.50
Dividend income	598,954.50	498,877.00	100,077.50
Income from funded securities and accounts	143,474.78	110,566.14	32,908.64
Income from unfunded securities and accounts	552,454.06	279,964.49	272,489.57
Miscellaneous income	156,856.18†	102,609.45†	—54,246.73
Total non-operating income	\$1,298,026.64	\$1,152,276.28	\$145,750.36
Gross income	\$20,751,011.98	\$19,359,467.69	\$1,391,544.29
DEDUCTIONS FROM GROSS INCOME			
Rent for leased roads	\$2,736,451.16	\$2,736,021.30	\$429.86
Miscellaneous rents	4,256.90	2,700.17	1,556.73
Miscellaneous tax accruals	15,104.14	14,015.09	1,089.05
Interest on funded debt	3,201,121.03	3,320,967.40	—119,846.37
Interest on unfunded debt	440,061.62	408,136.11	31,925.51
Amortization of discount on funded debt	155,564.98	104,753.99	50,810.99
Maintenance of investment organization	1,781.95	1,633.34	148.61
Miscellaneous income charges	20,222.20	47,030.57*	67,252.77
Total deductions from gross income	\$6,574,563.98	\$6,541,196.83	\$33,367.15
Net income	\$14,176,448.00	\$12,818,270.86	\$1,358,177.14
DISPOSITION OF NET INCOME			
Dividends declared (30 per cent 1923, 14 per cent 1922)	\$3,747,280.00	\$2,623,096.00	\$1,124,184.00
Surplus for the year carried to profit and loss	\$10,429,168.00	\$10,195,174.86	\$233,993.14

*Credit balance.
†Debit balance.

Revenues, tonnage and passengers

The total operating revenues were \$94,798,042.04, an increase of \$11,371,634.77, or 13.63 per cent.

Freight revenue was \$64,138,680.54, an increase of \$8,417,522.59, or 15.11 per cent. There were 32,323,248 tons of revenue freight carried, an increase of 7,061,422 tons, or 27.95 per cent.

The larger per cent of increase in tonnage as compared with freight revenue is accounted for by the heavier movement of low grade commodities in 1923, notably coal traffic, which increased 3,463,988 tons.

Passenger revenue was \$21,466,657.65, an increase of \$2,219,035.48, or 11.53 per cent. The number of passengers carried was 4,991,450, an increase of 322,198, or 6.90 per cent. Of this increase, 264,660 was in interline passengers, accounting in great measure for the larger revenue.

The increase in mail revenue, \$33,585.05, and the increase in express revenue, \$133,452.02, reflect the greater volume of such traffic.

Other transportation and incidental revenues increased \$568,039.63.

Operating expenses

The following table shows the operating expenses by groups for 1923, compared with those for 1922:

Group	Amount	Increase
Maintenance of way and structures	\$11,416,975.54	\$2,409,381.90
Maintenance of equipment	20,120,147.35	2,076,919.37
Traffic	1,203,655.53	105,032.49
Transportation	32,220,715.87	3,311,209.23
Miscellaneous	966,574.68	97,324.03
General	1,782,924.57	102,936.36
Transportation for investment—credit	71,461.66	*39,628.87
Total operating expenses	\$67,639,531.88	\$8,063,174.51

*Decrease.

The increase in expense for maintenance of way and structures is attributable in part to the heavier traffic handled, resulting in a more extensive program of rail and ballast renewals and tie spacing than in 1922, and in part to substantial wage increases. Charges in connection with the replacement of the cantilever bridge at Niagara Falls were \$175,000 greater than in 1922.

In the maintenance of equipment group, repairs to locomotives, freight cars and passenger cars increased \$2,141,127.72, due to more intensive use incident to handling the larger volume of business and to the program for putting motive power into the most efficient condition.

In general the increase in transportation expenses is due to the heavier traffic. Lower prices contributed to a decrease in the fuel account, and there was a substantial decrease in charges for loss and damage to freight.

Net corporate income

After charges for dividends there remained a surplus of \$10,429,168, which was carried to the credit of profit and loss.

Property investment accounts

Increases in the property investment accounts for the year, as shown in detail elsewhere in this report, were as follows:

Road	\$4,390,069.01
Equipment	15,167,324.92
Improvements on leased railway property	55,294.17
Miscellaneous physical property	173,527.37
Total	\$19,786,215.47

Changes in funded debt

The changes in the funded debt of the company, in detail, were as follows:

The funded debt outstanding on December 31, 1922, was.... \$68,062,403.91

It has been increased as follows:

N. Y. C. Lines Equipment Trust 4½ per cent certificates of September 1, 1922	\$765,000.00
N. Y. C. Lines Equipment Trust 5 per cent certificates of June 1, 1923	5,480,000.00
	10,245,000.00
	\$78,307,403.91

and has been reduced as follows:

Payments falling due during the year and on January 1, 1924, on the company's liability for principal installments under equipment trust agreements as follows:

N. Y. C. Lines Trust of 1910, January 1, 1924	\$393,960.44
N. Y. C. Lines Trust of 1912, January 1, 1924	151,710.90
N. Y. C. Lines Trust of 1913, January 1, 1924	262,359.54
M. C. R. R. Trust of 1915, October 1, 1923	300,000.00
M. C. R. R. Trust of 1917, March 1, 1923	600,000.00
Equipment Trust No. 48 (1920), January 15, 1923	346,400.00
M. C. R. R. Co. proportion of N. Y. C. R. R. Co. Trust of 1920, April 15, 1923	467,664.75
N. Y. C. Lines Trust of 1922, June 1, 1923	373,000.00
N. Y. C. Lines 4½ per cent Trust of 1922, September 1, 1923	51,000.00
	2,946,095.63

Leaving the funded debt on December 31, 1923..... \$75,361,308.28

A net increase of \$7,298,904.37

New York Central Lines equipment trust of 1923

This trust was created by agreement dated June 1, 1923, to which The New York Central Railroad Company, The Michigan Central Railroad Company and The Cleveland, Cincinnati, Chicago and St. Louis Railway Company are parties. Under the trust, \$17,340,000 of 5 per cent equipment trust certificates maturing in equal annual installments of \$1,156,000 over a period of fifteen years were issued, representing approximately 75 per cent of the cost of the equipment leased by the Trustee to the railroad companies. The equipment allotted to this company under the trust, estimated to cost \$12,668,493.73, consists of 15 coaches, 18 baggage cars, 3 dining cars, 2,000 automobile cars and 2,000 refrigerator cars. The certificates are prorated among the railroad companies in proportion to the cost of the equipment allotted to each, this company's share being \$9,480,000.

Final settlement with Railroad Administration

Agreement was reached with the Director General of Railroads under which the company paid to the United States Railroad Administration \$10,500,000 in full settlement for the period of federal control for itself and the Chicago, Kalamazoo and Saginaw Railway Company, which was included in its contract.

The \$10,500,000 payable to the Railroad Administration was distributed between the two companies as follows:

Net amount payable by The Michigan Central Railroad Company \$10,554,948.17
Net amount receivable by the Chicago, Kalamazoo and Saginaw Railway Company 54,948.17

The net amount payable by this company, \$10,554,948.17, is the final balance agreed upon in general settlement after taking into account the various debits and credits arising under the contract and payments thereto made by the Railroad Administration to the company.

The total amount of compensation which accrued in the company's favor for use of its owned and leased lines during the period of federal control was \$17,584,886.64, of which there had been paid to the company prior to the final settlement, from time to time, on account of compensation, \$16,642,000. The total amount expended by the Director General for additions and betterments upon the company's owned and leased lines was \$11,756,806.87, including \$1,693,525.69, representing initial cash payment upon allocated equipment included in an equipment trust.

Guaranty period settlement

During the year the Interstate Commerce Commission determined the amount due to the company by the United States Government for the so-called Guaranty Period, March 1 to August 31, 1920, under the provisions of Section 209 of the Transportation Act, 1920, to be \$2,049,827.80, of which there had been paid on account, prior to 1923, \$910,000, leaving a balance of \$1,139,827.80, which was received during the year in full settlement.

Consolidation of railways

The Transportation Act, 1920, provided that the Interstate Commerce Commission should prepare a plan for consolidation of the railways of the continental United States into a limited number of systems. In September, 1921, the Commission announced its tentative plan, which provided for the establishment of a maximum of nineteen systems. The tentative plan for System No. 1—New York Central System—includes the Company and its controlled lines, thus recognizing the long established relationship of these companies to the New York Central System. The hearings before the Commission on the tentative plan so far as the Eastern carriers were concerned

began on May 16, 1923, and the taking of testimony in this proceeding was concluded by the Commission in December, 1923. No decision has yet been announced by the Commission.

Merchants Despatch, Incorporated

In the period between July 1 and December 31, 1923, approximately 3,000 refrigerator cars belonging to this company, and approximately 8,000 belonging to The New York Central Railroad Company were leased to Merchants Despatch, Incorporated (a subsidiary of Merchants Despatch Transportation Company, the entire capital stock of which is owned by The New York Central Railroad Company). This was done to permit greater specialization in the handling of perishable traffic, and should result in better control of the cars, better earnings thereon and the securing of additional perishable business. Contracts will be negotiated for the use of these cars on foreign lines when not required to protect New York Central Lines' originations. Merchants Despatch, Incorporated, has also assumed responsibility for furnishing ice and supervising refrigeration of all perishable shipments on the New York Central Lines, thereby relieving the operating departments of the details of this highly specialized service.

Automatic train control

The Interstate Commerce Commission on June 22, 1922, made an order requiring the installation of automatic train control upon a division of each of forty-nine railroads, among which was this company. The order required that a division for such installation must be selected by January 1, 1923, and that the installation must be completed by January 1, 1925. The Train Control Committee of Signal Engineers, which had been studying the matter for many years on behalf of this company and other lines of the New York Central System, recommended that the division between Detroit and Jackson should be selected and prepared specifications and invitations for bids for the installation. These invitations were sent out on November 23, 1923, but the time for receiving and opening bids did not expire until after the close of the year.

New arch bridge over Niagara River at Niagara Falls

Work on the new steel arch bridge over the Niagara River to replace the present cantilever bridge, progressed satisfactorily. The approaches on both sides of the river and the piers for the arch span, including the tunnels for its anchorage, were completed.

Yard extension at St. Thomas

An extension to the yard at St. Thomas so as to provide for the accommodation of full train lengths, was completed during the year.

Second track between Jackson and Rives Junction

A second track was laid for a distance of approximately ten miles between Jackson and Rives Junction, which will greatly facilitate the operation of both the Saginaw and Grand Rapids Divisions.

New receiving and classification yard at North Toledo

Substantial progress was made upon the construction of the northbound receiving and classification yard and car repair facilities, etc., at North Toledo. This project will greatly improve the handling of the heavy business on the Toledo Division.

Appreciative acknowledgment is made to officers and employees of their loyal and efficient co-operation and service.

For the Board of Directors,

ALFRED H. SMITH,
President.

[ADVERTISEMENT]

(Continued from page 1846)

the company from paying larger dividend to common stockholders than to the preferred. They take exception to contention that the question of dividends was decided by the United States Supreme Court. They declare neither the United States District Court nor the Supreme Court gave any decision on dividends as discussion of this subject was only incidental and argumentative in connection with the main question of whether common and preferred stockholders should share on an equal basis the company's capital assets in liquidation. Preferred stockholders describe the suit against them as an unwarranted effort without legal basis to interfere with the proper and orderly conduct of a case in another court having co-ordinate jurisdiction. A date for argument will be set by the court.

SAN ANTONIO & ARANSAS PASS.—Annual Report.—The results of operation during the year ended December 31, 1923, compare with the previous year as follows:

	1923	1922	Increase or decrease
Operating revenues	\$6,455,496	\$5,780,170	\$675,326
Operating expenses	5,421,599	5,263,282	158,317
Net revenue from railway operations	1,033,897	516,888	517,009
Railway tax accruals	190,589	180,167	10,422
Total operating income	837,902	333,068	504,835
Gross income	902,117	378,469	523,648
Total deductions from gross income	1,425,403	1,492,350	—66,947
Net loss	523,286	1,113,881	—590,595

SEABOARD AIR LINE.—Florida Line.—The Interstate Commerce Commission has set for hearing on July 1 at Washington, before Examiner Davis, this company's application for authority to acquire control of the Florida Western & Gulf and to assume obligations incident thereto.

SOUTHERN.—Abandonment.—This company has applied to the Interstate Commerce Commission for authority to abandon its Burgin Branch, from Burgin Junction to Burgin, Ky.

VIRGINIAN.—Bonds Sold.—A syndicate headed by the National City Company has sold \$10,000,000 first mortgage 50-year 5 per cent gold bonds, series A, due 1962.

VICKSBURG, SHREVEPORT & PACIFIC.—Bonds.—This company has applied to the Interstate Commerce Commission for authority to sell \$3,000,000 of refunding and improvement 6 per cent bonds to Spencer, Trask & Co., at 97½.

WASHINGTON, IDAHO & MONTANA.—Compensation for Federal Control.—A board of referees appointed by the Interstate Commerce Commission has issued a report finding that \$28,339.79 is due to this company from the government, including \$15,000 as compensation for the period January 1 to June 25, 1918, while it was under federal control and \$13,339.79 as representing its operating deficit for the federal control period.

Dividends Declared

Albany & Susquehanna.—4½ per cent, payable July 1 to holders of record June 14.
Allegheny & Western.—3 per cent, payable July 1 to holders of record June 21.
Boston & Providence.—\$2.50, quarterly, payable July 1 to holders of record June 20.
Illinois Central.—Common, \$1.75, quarterly; preferred, \$3, semi-annually; both payable September 2 to holders of record August 1.
Joliet & Chicago.—1¼ per cent, payable July 1 to holders of record June 20.
Kansas City Southern.—Preferred, 1 per cent, quarterly, payable July 15 to holders of record June 30.
Norfolk & Western.—Common, \$1.75, quarterly, payable September 19 to holders of record August 30; adjustment preferred, \$1, quarterly, payable August 19 to holders of record July 31.
Old Colony.—\$1.75, quarterly, payable July 1 to holders of record June 14.
Philadelphia & Trenton.—2½ per cent, quarterly, payable July 10.
Pittsburgh, Cincinnati, Chicago & St. Louis.—2 per cent, quarterly, payable July 19 to holders of record July 10.
St. Louis, Rocky Mountain & Pacific.—Preferred, \$1.25, quarterly, payable June 30 to holders of record June 16.

Trend of Railway Stock and Bond Prices

	June 24	Last Week	Last Year
Average price of 20 representative railway stocks	66.45	66.23	62.40
Average price of 20 representative railway bonds	87.14	87.60	82.81

Railway Officers

Executive

Thomas W. Hulme, general real estate agent of the Pennsylvania, with headquarters at Philadelphia, Pa., has been promoted to vice-president in charge of real estate, taxes and valuations, a newly created position.

Operating

E. B. Taylor, Jr., assistant to the superintendent of the Panhandle division of the Pennsylvania, with headquarters at Pittsburgh, Pa., has resigned.

J. D. Scott, assistant road foreman of engines, has been appointed acting assistant trainmaster of the Monongahela division of the Pennsylvania, with headquarters at Youngwood, Pa.

Traffic

A. B. Sutton has been appointed commercial agent for the Gulf, Mobile & Northern, with headquarters at Detroit, Mich.

F. G. Ocsek has been appointed commercial agent for the Chicago, Indianapolis & Louisville, with headquarters at Chicago.

T. W. Partlan, traveling freight agent for the Virginian, with headquarters at Pittsburgh, Pa., has been promoted to general agent, with the same headquarters.

C. D. Bailey, chief clerk to the general freight and passenger agent of the Wrightsville & Tennille, has been appointed commercial agent, at Dublin, Ga., his former position having been abolished.

Julien L. Eysmans, traffic manager of the Central region of the Pennsylvania, with headquarters at Pittsburgh, Pa., has been promoted to assistant general traffic manager, with headquarters at Philadelphia, Pa. **John J. Koch**, freight traffic manager, with headquarters at Pittsburgh, has been promoted to traffic manager of the Central region, with the same headquarters, succeeding Mr. Eysmans. **W. C. Glynn**, assistant freight traffic manager at Pittsburgh, has been promoted to freight traffic manager, with the same headquarters, succeeding Mr. Koch. **V. C. Williams**, general freight agent, has been promoted to assistant freight traffic manager, with headquarters at Pittsburgh, succeeding Mr. Glynn. **C. T. Mackenson, Jr.**, assistant general freight agent, has been promoted to general freight agent, succeeding Mr. Williams. **W. R. Cox**, division freight agent at Youngstown, Ohio, has been promoted to assistant general freight agent of the Central region, with headquarters at Pittsburgh, succeeding Mr. Mackenson, Jr.

Engineering, Maintenance of Way and Signaling

C. W. Richy, division engineer of the Conemaugh division of the Pennsylvania, with headquarters at Pittsburgh, Pa., has been transferred to the general manager's office, with the same headquarters.

Frank A. Merrill, engineer maintenance of way of the Boston & Maine, with headquarters at Boston, Mass., has been appointed also chief engineer, succeeding Arthur B. Corthell, deceased, the engineering and maintenance of way departments having been combined. Mr. Merrill began railroad work on the Concord & Montreal and was serving as chief engineer of that road when it became part of the Boston & Maine. He continued in the service of the Boston & Maine as division engineer and was later appointed assistant chief engineer. In 1914 he was appointed engineer maintenance of way, in which capacity he was serving at the time of his recent appointment as chief engineer.

Obituary

General Nathaniel Wales, formerly general superintendent of the Boston & Albany, died at his home in Jamaica Plain, Mass., on June 18 at the age of 81. General Wales was born in Boston and served for three years in the Union Army in the Civil War. He was imprisoned in Libby Prison, Richmond, and was discharged for disability. After the war, he was a brigadier-general in the Massachusetts militia. He retired from the service of the B. & A. about 1906.

F. A. Butterworth, assistant general freight agent of the Pere Marquette, with headquarters at Chicago, died in that city on June 17. Mr. Butterworth was born in December, 1856. He entered railway service in 1875 as a billing clerk on the Grand Trunk and later held various positions in the traffic departments of the Chicago, Milwaukee & St. Paul and the Detroit, Grand Rapids & Western. He was appointed commercial agent for the Pere Marquette in January, 1900, and in April, 1906, was promoted to general eastern agent at New York. Mr. Butterworth was promoted to assistant general freight agent, with headquarters at Chicago, in November, 1909, and held that position until his death.

Edgar M. Reynolds, comptroller of the Lehigh & New England and vice-president and comptroller of the Lehigh Coal & Navigation Company, with headquarters at Philadelphia, Pa., died on June 16 at his home in Germantown, Pa., following an illness of four weeks. Mr. Reynolds was born on May 2, 1861, at Newark, N. J., and entered railway service in 1881 as a clerk in the office of the auditor of passenger receipts of the Central of New Jersey. In August, 1882, he became a clerk on the Lehigh & Hudson River and in January, 1883, he became an auditor. In November of the same year he was appointed general passenger agent of the Cincinnati, Van Wert & Michigan (now the Cincinnati Northern) and on January 1, 1886, he was appointed auditor of the Lehigh & Hudson River. He entered the service of the Lehigh Coal & Navigation Company and subsidiary companies as auditor on May 1, 1905, and on September 1, 1909, he was appointed comptroller of the same companies and also of the L. & N. E.

Robert E. McCarty, assistant to the vice-president of the Central region of the Pennsylvania, with headquarters at Pittsburgh, Pa., and vice-chairman of the operating division of the American Railway Association, died at his home in Crafton, Pa., on June 4. Mr. McCarty was born on April 25, 1862, at Leavittsville, Ohio, and was educated in the common schools of Carrollton, Ohio. He entered railway service in July, 1879, as a telegraph operator of the Pittsburgh, Cincinnati & St. Louis (now the Pennsylvania) at Bowerston, Ohio, and on September 2, 1882, he was promoted to train dispatcher, remaining in that capacity until March 1, 1895, when he was advanced to assistant trainmaster. He was appointed trainmaster on July 1, 1896, and on January 1, 1902, he was appointed superintendent of the Pittsburgh division. In April, 1905, he was promoted to general superintendent and when the Pennsylvania extended its line from Toledo, Ohio, to Detroit, Mich., he was appointed resident vice-president, on January 1, 1917, at Detroit. For a short time in 1918 he was transportation assistant and later was made federal general manager. At the termination of federal control Mr. McCarty was appointed general manager, with headquarters at Pittsburgh, and on March 1, 1923, due to failing health, he was appointed assistant to the vice-president, the position he held at the time of his death.



R. E. McCarty

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A-18-S**



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Railway Age

Vol. 76

June 28, 1924

No. 38



Reading Station, Tuckahoe, N. J.

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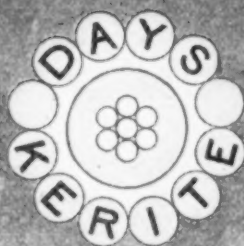
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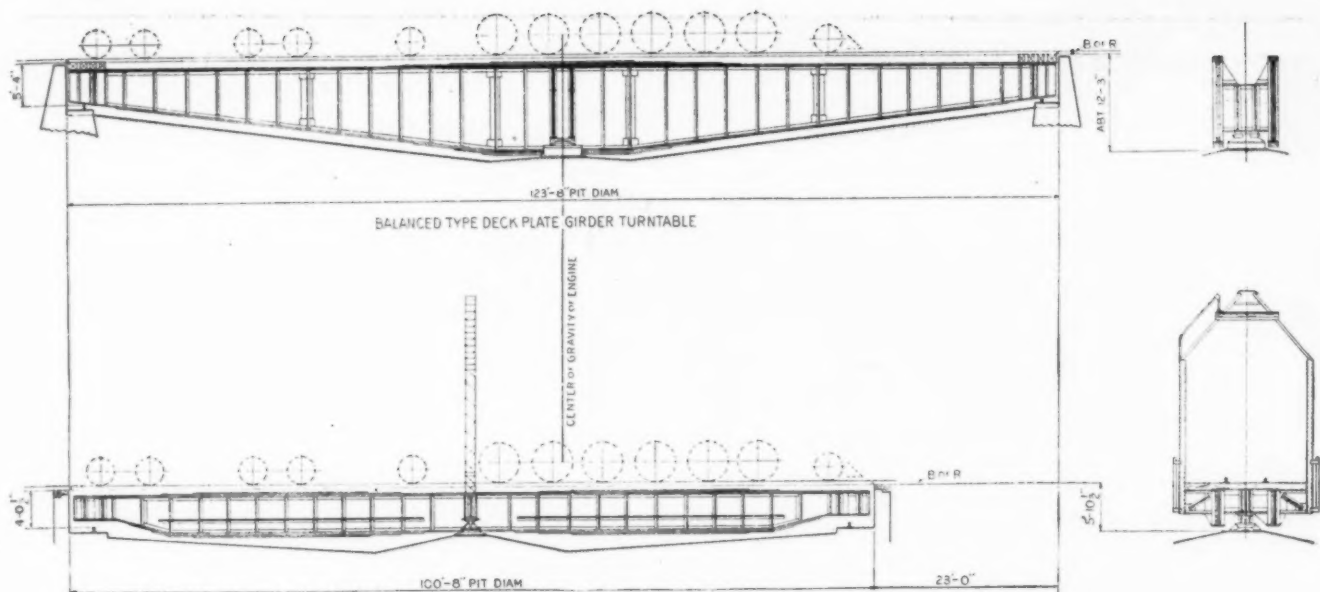
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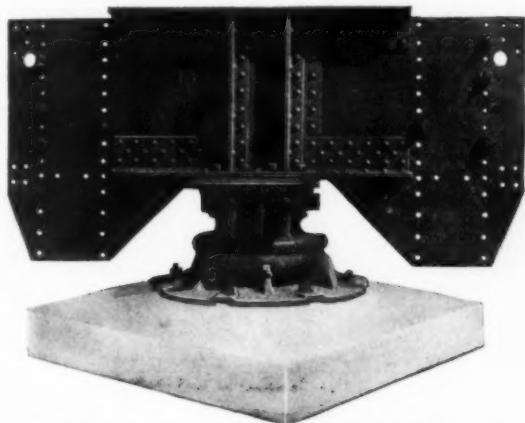
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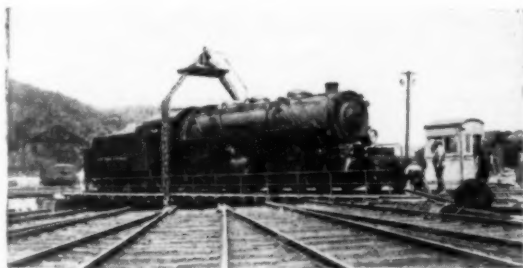
BETHLEHEM TWIN-SPAN TURNTABLE
BETHLEHEM TWIN-SPAN TURNTABLE COMPARED WITH BALANCED TYPE OF TABLE

Diagrams show tables for Turning Mallet Engine having wheel base of 97' 3 $\frac{3}{4}$ " and weighing 828,400 pounds. Due to the fact that the Engine need not be balanced

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Center and Transverse Girder of Bethlehem Twin-Span Turntable



Bethlehem Twin-Span Turntable—New York Central Lines, Cerning, N. Y.

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THE saving in first cost of a Bethlehem Twin-Span Turntable against the first cost of a balanced turntable of equal capacity is an important item. This saving varies from ten to thirty per cent according to the conditions surrounding the location of the table.

The reasons for this saving are the shorter length of table required to handle equivalent length locomotives, and the smaller pit required to accommodate the table.

It is not necessary to balance a Bethlehem Twin-Span Turntable; consequently it has a greater capacity than a balanced type table of equal length; likewise, for turntables of equal length, the Bethlehem Twin-Span Turntable will turn locomotives from ten to twenty per cent longer than can be handled on the balanced type.

Calling in our engineers to confer with and assist you in the analysis of your locomotive terminal problem, places you under no obligation. They will be glad to demonstrate the advantages of the Bethlehem Twin-Span Turntable.

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What the C. & E. I. Has Learned

The C. & E. I. was the first steam road actually to develop the automatic stop to service efficiency on an extended scale, and in this respect is the pioneer in this work. Its officers have satisfied themselves as to the practicability of the device as a factor preventing the failure of the engineman to interpret signal indications correctly, and have found that it enables the engineman to know the condition of the track at a point the proper braking distance from signals in stormy and foggy weather. Automatic applications of the air on long freights have not resulted in damage to equipment. * * *

It was the thought of the management that a train control device to be practicable should be of easy application and reasonable in first cost; that the operation and maintenance charges should be low and that it should not interfere with standard roadside clearances. No locomotives have been held out of service because of applying or maintaining control apparatus during all of the years of development and operation. Regarding clearances, engines on the C. & E. I. are not assigned, and it is the practice to run engines carrying control equipment over tracks outside of control territory as well as over the tracks of foreign lines. As an example, engines carrying control equipment operate over the tracks of the Cleveland, Cincinnati, Chicago & St. Louis between Pana Ill., and St. Louis, Mo., and daily over the tracks of the Chicago & Western Indiana from Dolton, Ill., to the Dearborn street station, Chicago.

—Excerpt from an article entitled, "Train Control Experience of One Road," published in the *Railway Age*, November 3, 1923.

SAUNTONYA.

Miller Train Control

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(Continued in the next issue.)

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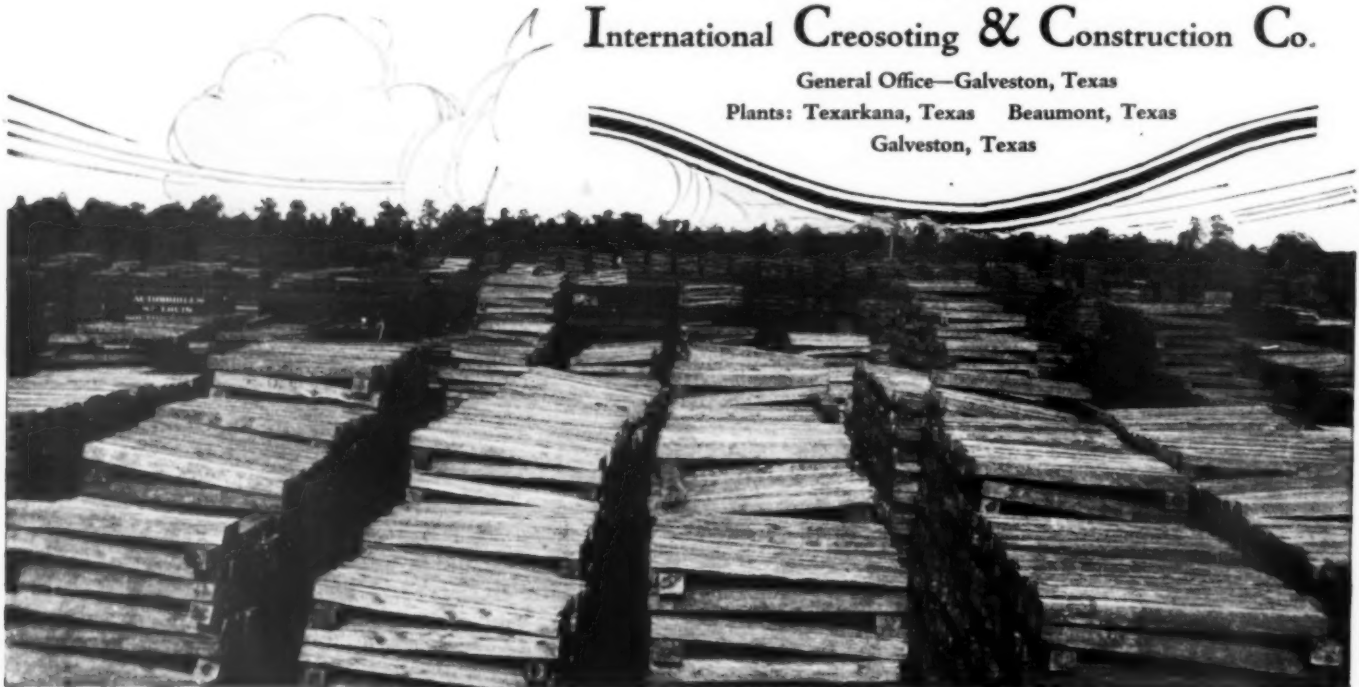
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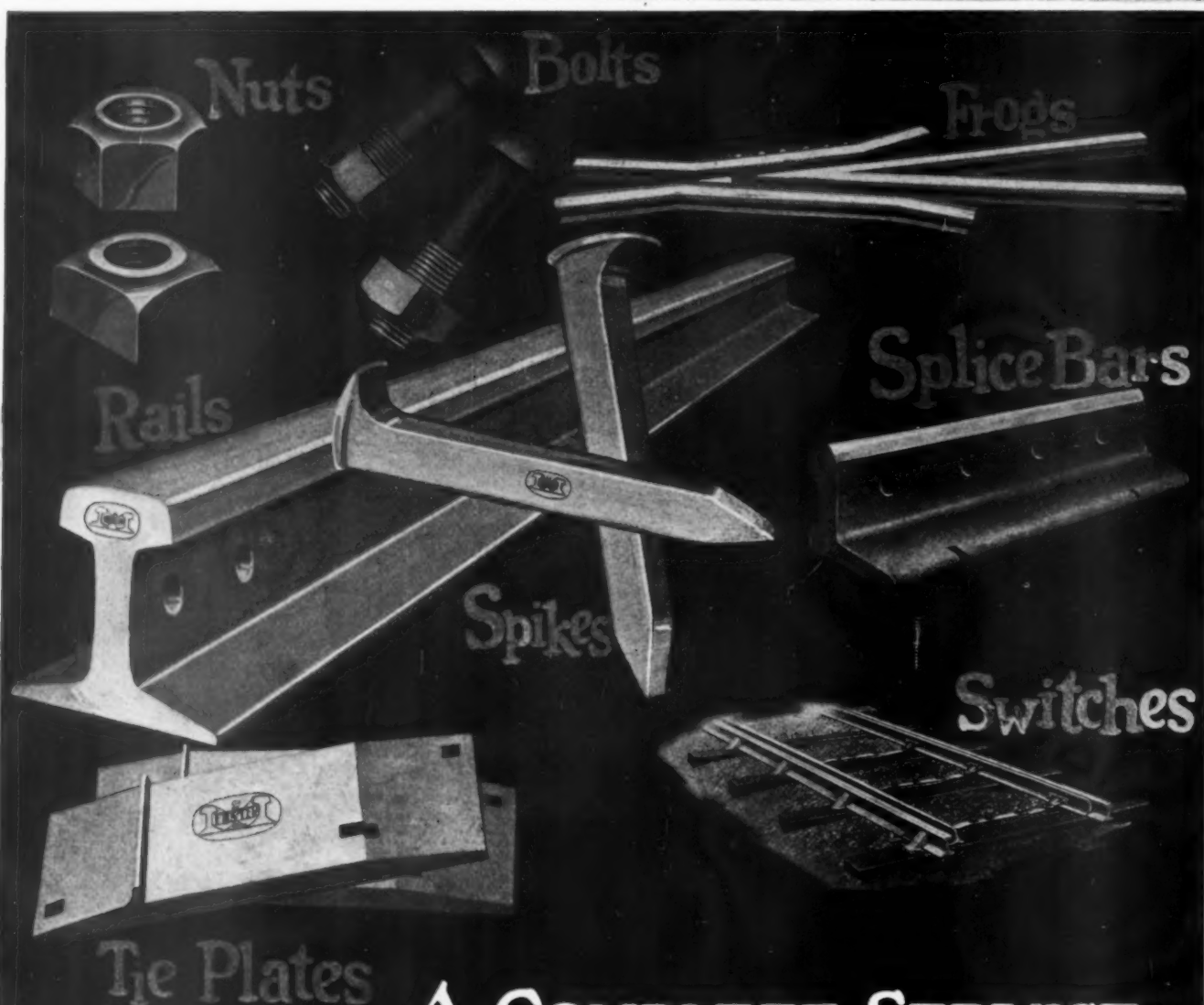


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HAVE YOUR
TERMINALS
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BEFORE
BAD WEATHER.**

**NELSON
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ON TIME
AND
KEEP
YOUR MECHANICAL
DEPARTMENT CONTENTED.**

JOSEPH E. NELSON & SONS
CONTRACTORS
3240 South Michigan Avenue
Chicago, Illinois





A COMPLETE SERVICE

Buyers of Relaying Rails, New Rails and Track Accessories realize that FOSTER'S complete warehouse stock means immediate shipments, attractive prices and their complete requirements from one source.

1 Ton or 1000

*Phone, Wire or Mail
Inquiries Given
Immediate Attention*

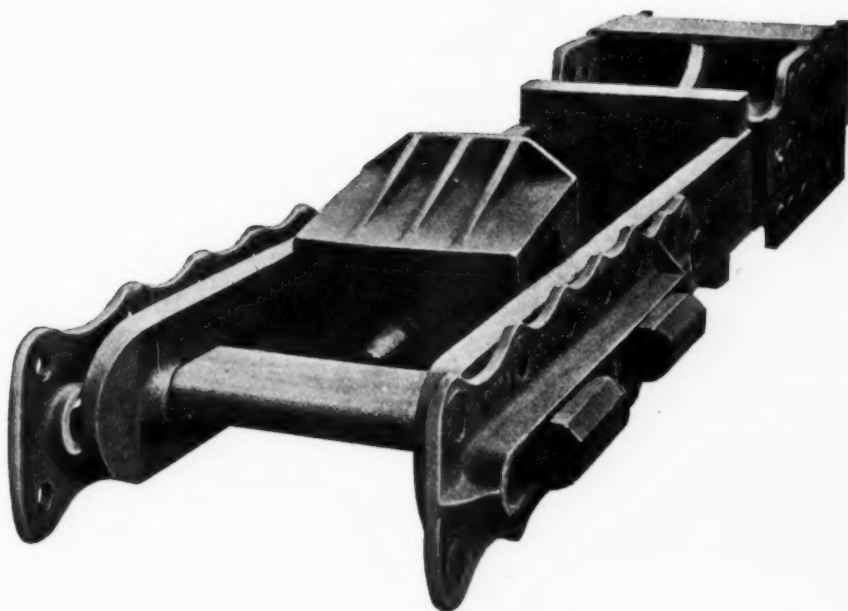
L. B. FOSTER CO., Inc.
Pittsburgh, Pa.—New York City

WAREHOUSES:
Pittsburgh Philadelphia Jersey City Hamilton, O.



FARLOW

DRAFT ATTACHMENTS



Have a Record of 19 Years



A car device with 19 years' service record and increasing ratio of applications every year certainly has made good.

Farlow Draft Attachments have been applied to over 640,000 cars.

Farlow Draft Attachments are designed to improve service and cut costs and they will do it too—for you.

THE T. H. SYMINGTON COMPANY

Farlow Draft Gear Attachments.

Pressed Steel Side Frames.

Malleable Iron Journal Boxes.

New York

Chicago

Baltimore

Boston

Montreal

WORKS: ROCHESTER, N. Y.

Announcing — A

~for abstracting waybills
in less time
at less cost
absolutely accurate



This new Burroughs is built with those automatic features that will save the operator the utmost time in abstracting waybills. The automatic handling of the work is a further safeguard against error.

Just look at these features:

Totals in Six Columns—giving you separate totals of each column and, if you desire, a combined total of any or all columns.

Automatic Extension of Totals—one key depression writes complete total. No copying—no chances for error.

Automatic Tabulation and Decimal Selection—this machine not only tabulates automatically but it selects proper decimal position. It writes dollars under dollars and cents under cents and punctuates both automatically.

Motor Returned Carriage—another time-saving feature that relieves the operator of additional work.

Light Key Touch and Quick, Easy Operation—lessens fatigue and insures better work.

This machine is in daily operation in a few important railroad offices already. For these railroads it is giving neater and more accurate work with almost thirty per cent greater speed—a remarkable saving that you, too, can make with this machine.

HERE is a new Burroughs that will save time and money in abstracting waybills in every local freight office in the country.

It is designed—after thorough and intensive study of this particular problem—to handle this routine figuring job in the easiest, quickest and most economical way.

Just look at the Waybill Abstract on the opposite page! Look at its neatness and its accuracy. Then note that it is made in thirty per cent less time than you can make it by any other method.

This new Burroughs is so flexible that it will save time and money on any form of waybill abstract—so automatic that it relieves the operator of most of the routine.

The same Burroughs can be used in preparing other reports, such as—junction settlement sheets, cash books, pro register, payrolls, etc.

No matter how you are handling this work at present, you will want to know whether this new Burroughs will save time and money for you. Let us demonstrate. There's no obligation. Call our nearest office—your telephone book will give the address—or mail the coupon.

This new Burroughs will be displayed by the Railroad Division of the Burroughs Adding Machine Company at the convention of the Railway Accounting Officers Association in San Francisco, July 8-12. If you attend this convention don't fail to see this machine in operation.

Burroughs



New Burroughs

Burroughs North & South Railway Co.
WAYBILL ABSTRACT

Daily Report of _____ INTERLINE _____
 Waybills Received at _____ DETROIT MICH _____
 Sheet No. 5 JUNE 10TH 1924

WAYBILL		CAR		STATION From	Billing Road	Kind of Freight	WEIGHT	DEBIT		CREDIT	PRO NUMBER	Prepaid Beyond	Total Collect	CONSIGNEE
Date	Number	Initial	Number					Freight	Advances					
6-2	4.51			CINCINNATI O	PRR		1.00	57	1.05		250		1.62	J L SWARTZ CO
6-1	10.62			BUFFALO NY	B&E		2.70	1.35	1.50		251		1.35	J L MEYER
6-2	150.25			SYRACUSE NY	NYC		5.92	1.69	1.24		252		3.20	D J BEASELY CO
6-2	150.30						6.50	1.85	1.35		253		12.13	CROWELL MFG CO
6-5	21.95			MOBILE ALA	MAO		21.47	12.13			254		12.13	H JACOBS SONS
6-3	22.56	DL&W	439.56	BLOOMFIELD PA	DL&W	COAL	876.00	38.60	112.45	231.62	255	80.57	153.21	M C RR
6-2	42.84	NYC		UTICA NY	NYC	FURN	352.00	32.45	120.76		256		203.89	A SANDERS CO
6-3	103.20	AT&SF	350.24	ST LOUIS MO	WAB	FEED	621.00	24.65	132.58	157.23	257		27.16	N R WOOD CO
6-3	112.01	PRR	500.123	PITTSBURGH PA	PRR	MCHY	827.00	38.65	165.24		258			U S TIRE CO
6-4	352	C&N&J	176.35	ELMHURST NY	DL&W	INCUB	433.00	27.34	89.76	144.26	259			P M RY
TOTALS							3146.59	179.28	625.93	537.54		107.75	378.40	

This is a composite form of the waybill abstracts used by different railroads.

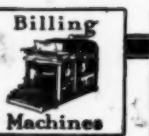
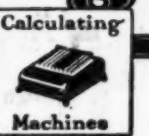
Note the totals of six different columns which were accumulated and automatically printed (not copied) by this Burroughs.

Note the neatness and accuracy of the form.

Finally, note that writing waybill abstracts this way **saves thirty per cent** of the time required by any other method.

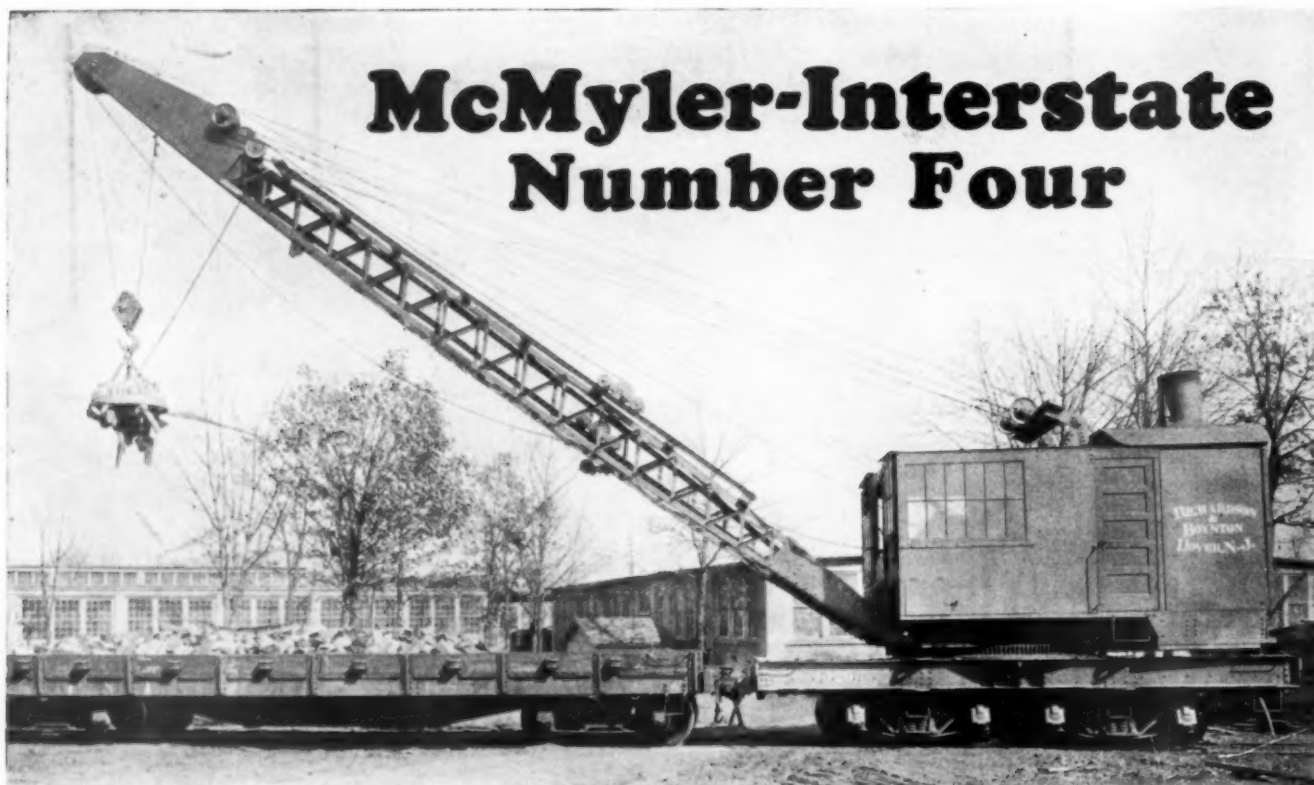


Burroughs



Burroughs Adding Machine Co.
 Railroad Division, Detroit, Mich.
 I would like to have more information about the new Burroughs Machine for Abstracting Waybills.

Name _____
 Road _____
 Address _____



McMyler-Interstate Number Four

a high speed 20-ton crane

On maintenance work, No. Four will handle an excavating, rehandling or dragline bucket. Or it may be fitted with pendulum leads for pile driving. Ability to accurately spot loads handled on the fall block make it exceptionally well suited for bridge construction jobs. When equipped with a generator set, it will handle a No. 4 lifting magnet.

A large non-reversing engine in conjunction with large right and left hand friction clutches contributes greatly to the speedy performance of this crane. Swinging, traveling or booming can be accomplished

in either direction while raising or lowering the load.

The turntable is cast steel. All gears are steel and all gears above the turntable have accurately machined teeth. The cab is steel and it fully protects the operator and all parts of the mechanism. Bearings are replaceable. Utmost accessibility has been achieved.

Bulletin 53 gives outline specifications and tells in detail about the design and construction of this high speed 20-ton crane. May we send a copy for your files?

Locomotive Cranes • Steam Shovels • Crawler Cranes • Clam-shell Buckets

THE MCMYLER-INTERSTATE CO. CLEVELAND

NEW YORK PHILADELPHIA BUFFALO PITTSBURGH DETROIT CHICAGO SAN FRANCISCO



Lock—*Absolute* Opened—*Instantly*

CARS equipped with Wine Door Locks deliver full lading—loss of loads in transit is impossible.

Insurance of this dependable locking feature calls for no delicate or complicated working parts—Wine Door Locks are universally recognized to be the simplest of all drop door mechanisms.

The hoppers or drop doors on cars equipped with Wine Door Locks can be opened almost instantly—a few light hammer taps is all that is required to knock out the keeper dog and latch.

This is all—the hoppers open and the load is dropped.

Specification of Wine Door Locks is a worth-while investment. They speed unloading of cars and prevent loss of freight in transit.

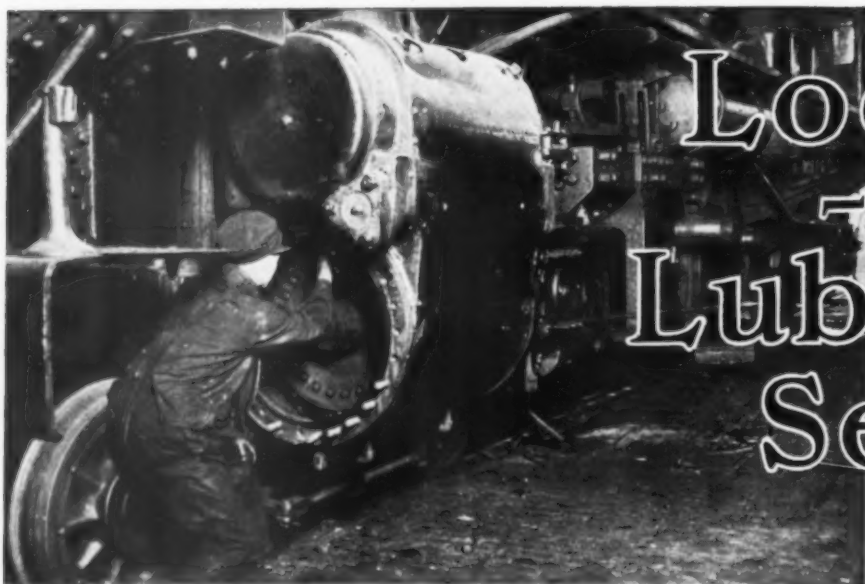
The Wine Railway Appliance Co.

Grand Central Terminal
New York

Toledo, Ohio

Peoples Gas Building
Chicago, Ill.

Wine Door Locks



Look Into -your- Lubrication Service

WITHOUT consideration of SERVICE received, it is inaccurate and misleading to compile figures on lubrication costs. Calculations based on "so many gallons at so much per gallon," tells only part of the story. A very important part is often disclosed through an analysis of the item—REPAIRS.

On the sixty odd thousand of steam locomotives now operated in handling railroad transportation in the United States, the expense of "repairs" alone—in their maintenance cost—amounts annually to nearly fifty times the entire cost of the oils used in lubricating them.

Just how much of these "repairs" are made necessary by shortcomings in the lubricants used is valuable information for the railroad to have. It furnishes a most reliable basis for ascertaining not only the service efficiency of the lubricants, but their ultimate, or actual cost.

It is through comparisons of this kind that the superiority of GALENA LUBRICATION becomes apparent. There are many instances where the installation of Galena Oils and Service have effected reductions in such maintenance expense items that exceeded in money value the total cost of the oils used. Figuratively, Galena lubrication cost the roads "less than nothing."

The cost of the repair job demanded because of failure of the lubricant to protect; the reboring of cylinders and replacement of packing rings or brasses, because of scoring or heating, due to inefficient lubrication, is in reality just as truly a lubrication expense as the cost of the oil itself.

Such facts are plainly evident. In judging lubrication performance they cannot be ignored. No other means offers a more reliable or accurate basis for determining the real quality of the lubrication your equipment is receiving. A record that involves little time and gives invaluable information.

*Galena Oils and Service prove their
economy in lower maintenance.*



Galena-Signal Oil Company

New York

Franklin, Pa.

Chicago

and offices in principal cities





In this tubular slotted positive plate lie the secrets of the Exide-Ironclad Car-Lighting Battery's high efficiency, reserve power, freedom from repairs, and long life in railway service. Our representative will be glad to show you samples of these plates and to explain to you the many merits of the Exide-Ironclad construction.

The Exide-Ironclad Car-Lighting Battery

THE Exide-Ironclad Battery enters a new branch of railway service. It is now available for car-lighting.

In other branches of railway service this battery has already won an enviable reputation for ruggedness, efficiency, long life, and power.

For railway car-lighting service, the Exide-Ironclad Battery is a worthy associate of the Exide Chloride Accumulator, which has been well and favorably known to railway electrical engineers for many years.

Railway men who have investigated all types of storage batteries tell us that

the construction and operating characteristics of the Exide-Ironclad Car-Lighting Battery place it in a class by itself.

Here is a car-lighting battery that is light in weight yet highly efficient; that is free from repairs yet possessed of splendid electrical characteristics; that has a long life yet is moderate in first cost.

We shall be glad to have our representative call and give you full information on the Exide-Ironclad Car-Lighting Battery. Drop us a line today, telling when it will be convenient for you to see him.

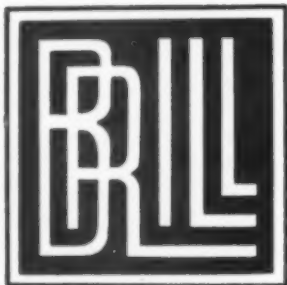
THE ELECTRIC STORAGE BATTERY COMPANY, PHILADELPHIA

In Canada, Exide Batteries of Canada, Limited, 133-157 Dufferin Street, Toronto



Placed in service between Mineral Wells and Seymour, Texas, for hauling package freight and express.

Motorized Railway Service



Write for copy
Gasoline Car Catalog
No. 275

The success which has attended the operation of a Brill Model 55 Gasoline Car in passenger service by the Gulf, Texas & Western Railway is largely responsible for the motorization of its package freight and express service.

Economical operation of these self-propelled cars may be taken advantage of by many short or branch railroads. In the complement of cars of this type developed, including the Model 55 combination passenger and baggage, straight passenger motor and trailer, and the type illustrated, ample provision has been made to take care of the requirements of any contemplated service.

Complete information furnished upon request to

AUTOMOTIVE CAR DIVISION
The J. G. Brill Company
Philadelphia, U. S. A.



The CHEAT!

*"The Viewpoint of the Employee is
the Most Neglected Asset in Industry."*

THIS man is washing up at your shop before the noon whistle blows. You may not know him. He may not realize exactly what he is doing.

YET—he is cheating you of costly time. And your loss will be doubled before he leaves this afternoon.

Daily, in scores of ways, even the most dependable employees waste many precious minutes. The loss from delay in starting work morning and noon and in preparation for noon and night leaving, alone,

frequently averages 20 minutes per man per day. At fifty cents an hour, this means a waste of \$50 per man every 300 working days—an annual loss of \$50,000 for the shop with 1000 employees.

Usually, this astounding waste can be traced to some form of misunderstanding, ignorance, lack of care or poor judgment on the part of men or management. Whatever the cause of unwarranted losses, we can correct it—with great profit to both employer and employee.

Send for Booklet C

SHERMAN SERVICE, INCORPORATED

Man Engineering

NEW YORK
2 Rector St.

CLEVELAND
Park Building

BOSTON
31 Milk Street

PHILADELPHIA
1015 Chestnut Street

Production Engineers

CHICAGO
208 S. La Salle St.

DETROIT
First Nat'l Bank Bldg.

ST. LOUIS
314 N. Broadway

MONTREAL
Drummond Bldg.

TORONTO
10 Adelaide St., E.

Largest organization of its kind in the world

SYKES RAIL CARS

(PATENTS PENDING)

The N. Y., N. H. & Hartford R. R. has ordered ten motor coaches from THE SYKES COMPANY.

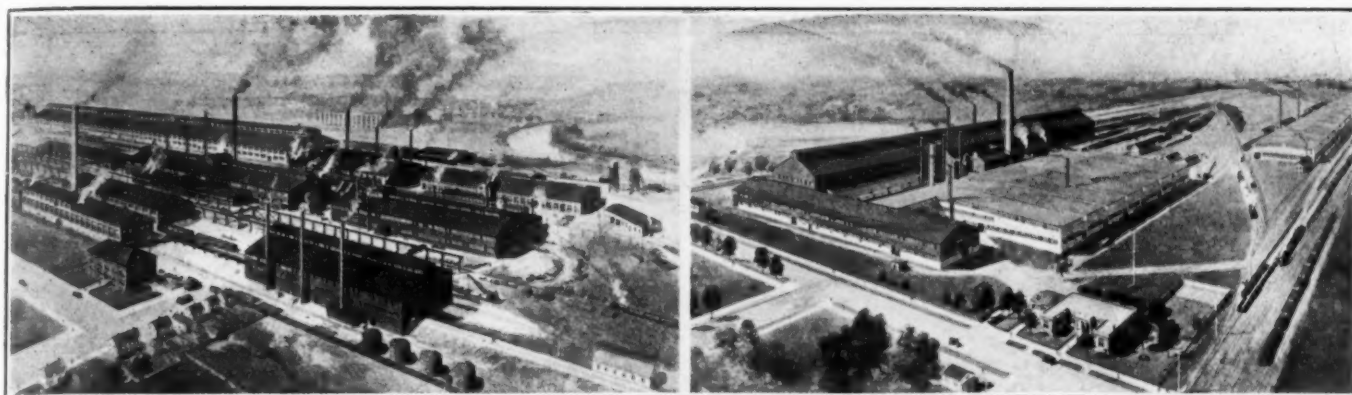
This is the largest order ever placed by an American Railroad for gasoline driven rail cars.

We believe this order was placed with us because the SYKES STANDARD RAIL COACH RUNNING GEAR has a greater factor of safety; is more rugged in construction, and therefore offers greater assurance of continuous operation—without interruption of service for repairs—than any other gasoline driven rail equipment now on the market.

THE SYKES COMPANY

LIBERTY-CENTRAL TRUST BLDG.

ST. LOUIS, MISSOURI



RAILWAY STEEL-SPRING CO., Latrobe Plant, Latrobe, Pennsylvania

RAILWAY STEEL-SPRING CO., Chicago Heights Plant, Chicago Heights, Illinois

"Railway" Products Are Manufactured In Modern Plants Conveniently Located



THE ideal situation of our numerous plants, fully equipped and of large capacity, at central points conveniently located for the distribution of products to diversified sections of the country, offers purchasers of "Railway Specialties" advantageous shipment and prompt delivery of equipment.

All of these plants are equipped with the most modern and up to date appliances, improved automatic labor-saving machinery and devices of our own special design and construction peculiarly adapted to the production of springs, tires and steel-tired wheels of uniformly high grade quality and workmanship.

Our facilities are unsurpassed and the capacity of our plants almost unlimited, and with the knowledge acquired by many years' experience in the railroad field combined with a most capable shop organization, thoroughly proficient and skilled in every detail and process of manufacture, we are in a position to meet all demands made upon us.

The services of our Engineering Staff and Corps of Traveling Engineers are available at all times for consultation and they will gladly co-operate with you in the solution of your particular problem.

Railway Steel-Spring Company

30 Church Street, New York

Branch Offices:

Chicago, Ill.
St. Paul, Minn.

Detroit, Mich.
Dallas, Texas

Norfolk, Va.
St. Louis, Mo.

Louisville, Ky.
Pittsburgh, Pa.

Denver, Colo.
Montreal, Que.



The Shop Crew Gets a Booster

BOB HUG, schedule supervisor at the Silvis shops of the Rock Island at Moline, Ill., is mighty proud of the Baker Truck shown above.

And well he may be, for the labor, time and money an industrial truck like this saves, enables any department to make a better showing than it possibly could with old fashioned, out-worn methods of handling all sorts of material by hand.

The Baker Utility Truck has no equal for general delivery service about the shop. Its sturdy construction insures long life even under the hardest kind of uninterrupted use.

Large loads of heavy, bulky material are carried on its ample platform with speed and ease. Its broad tires and 20-inch wheels enable it to cross rough yards and tracks with little difficulty.

Baker Industrial Division

THE BAKER R & L COMPANY • CLEVELAND, OHIO

Fast, Husky and Trackless

DOWN the long shop aisles at 6 miles per hour, 4000 pounds on its load platform—up the steep ramp with never a pause in its progress—across shipping platforms and into the box-car—dropping its load and away again—a single Baker tractor or truck gets away with more work per day than a sizable gang of hand-truckers.

Write for a fully illustrated, explanatory catalog, or ask a Baker engineer to recommend the most efficient type for your requirements.

THE BAKER R & L COMPANY
Cleveland, Ohio

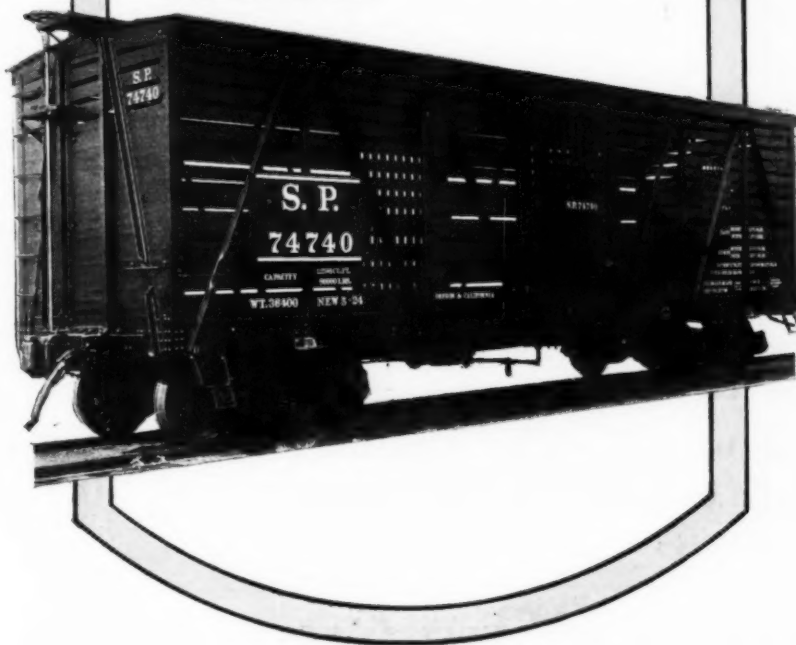
ELECTRIC TRACTORS AND TRUCKS
TRADE-MARK REG. U.S. PAT. OFF.
Baker



RALSTON



**ALL
STEEL
AND
COMPOSITE
CARS**



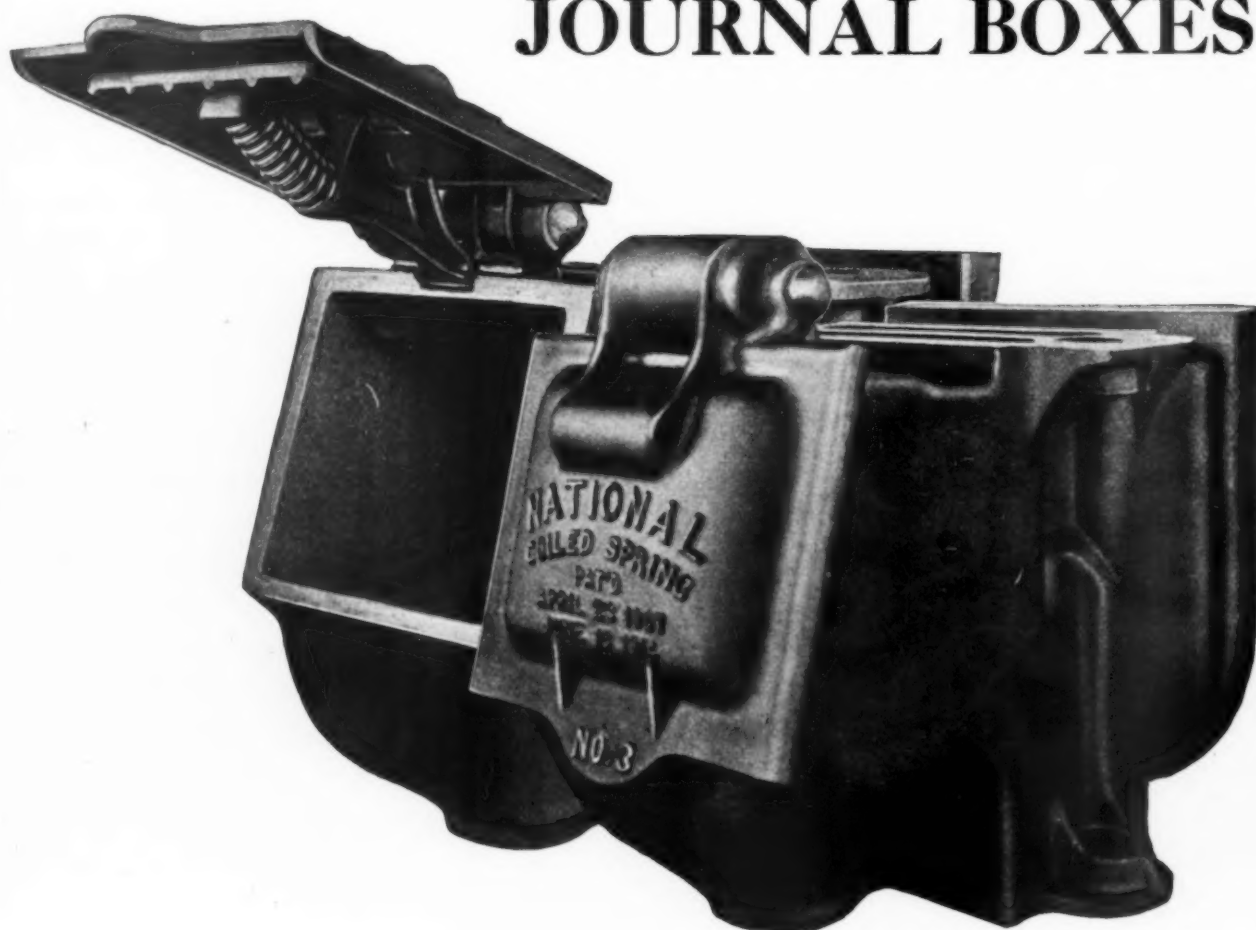
IN every outstanding feature of dependability, design, material and construction, Ralston Cars reflect the bigger manufacturing facilities that contribute to their longer service life and operating economies.

Behind this dominant position are organization—resources—and car building experience which road performance has consistently proven correct. That Ralston Cars deliver the maximum in ton mile hauls firmly establishes their value beyond all peradventure. They are factors that have long sustained Ralston as the priority choice of the most representative roads.

Repairing and repair parts always at a substantial saving have proven of inestimable value to railroads.

The Ralston Steel Car Co.
Columbus, Ohio

NATIONAL COILED SPRING JOURNAL BOXES



A. R. A. in every respect, embodying all the essential features of a high grade Journal Box.

**Manufactured in either Certified
Malleable or Electric Cast Steel.**

NATIONAL MALLEABLE AND STEEL CASTINGS CO.

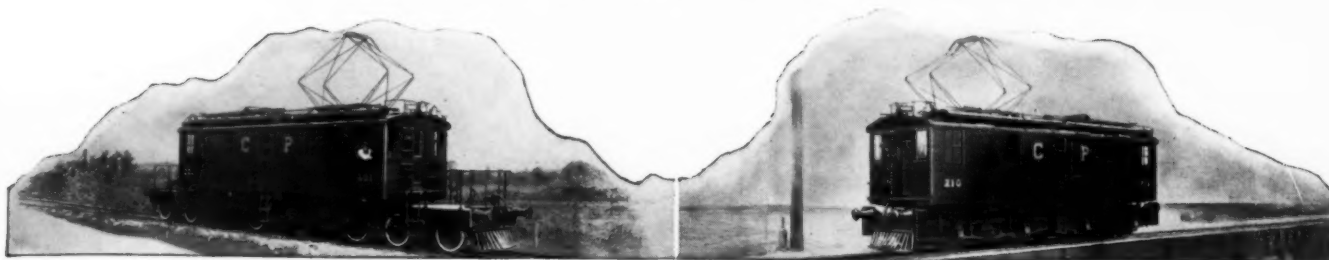
Successor To

THE NATIONAL MALLEABLE CASTINGS COMPANY

General Office—Cleveland, O.

Works: Cleveland, Chicago, Indianapolis, Toledo, East St. Louis, Ill., Sharon, Pa., Melrose Park, Ill.

Paulista Electrification Results



Cost of Electric Operation 1/3 that of Steam

TOTAL COSTS ON THE BASIS OF A YEAR'S SERVICE OF 465,750 TRAIN MILES

	Cost per Train Mile	
	Steam	Electric
Operating Trains	63.09¢	19.30¢
Locomotive Repairs	6.83	2.18
Transmission Line Operation and Maintenance	—	0.46
Trolley Line Operation and Maintenance	—	1.03
Total	69.92¢	22.97¢

THE Paulista Railway was the first steam road in Brazil to adopt electric traction. It furnishes an interesting example of an electrification where the decision to electrify was made solely on these two considerations: greater economy in operation and general improvement in service.

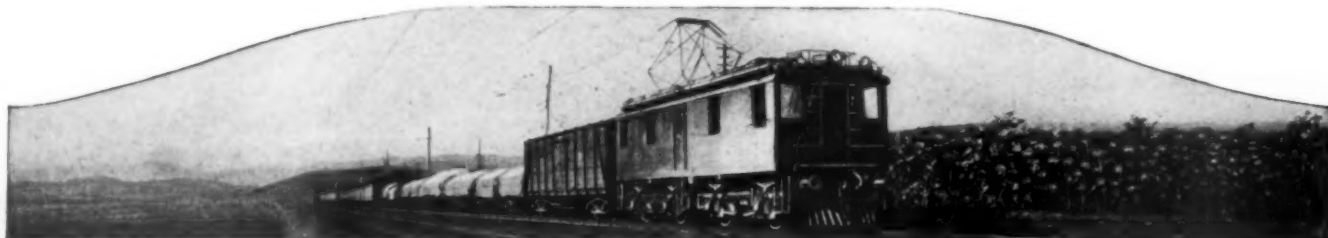
The greatest factor compelling electrification was the high cost of fuel—both coal and wood. Coal is imported, and wood is growing more and more difficult to obtain, with prices increasing in proportion. Therefore, the economy to be gained from this source was established.

The initial electrified section, between Jundiahy and Campinas was 27.3 route miles of double track, the throat of traffic from the interior of Brazil. The use of 3000 volts, direct-current, was decided upon as being the best suited to local requirements, based on the experience with existing installations.

The initial equipment included 10 miles of 88,000-volt double transmission line, 4500-kw. substation equipment, the trolley and distribution system and 12 electric locomotives, built jointly by the General Electric Company and American Locomotive Company. Later the rail-

AMERICAN LOCOMOTIVE COMPANY GENERAL ELECTRIC COMPANY

Paulista Electrification Results



Cost of Electric Power 1/4 the Cost of Coal

COST OF OPERATING TRAINS BASED ON 465,750 TRAIN MILES

	Steam		Electric	
	Total Cost	Per Train Mile	Total Cost	Per Train Mile
Coal, 20,000 tons metric, or electric power metered at power company lines	\$238,095.	51.14c	\$47,381.	10.18c
Transformation of power from 88,000 volts a-c. to 3,000 volts d-c.	—	—	8,343.	1.79
Engine drivers and firemen or assistants	29,762.	6.38	19,024.	4.08
Electricians, mechanics and helpers (running maintenance)	13,227.	2.84	2,931.	0.63
Locomotive wipers	2,679.	0.57	1,640.	0.34
Lubricants and miscellaneous material	10,089.	2.16	10,607.	2.28
Total	\$293,852.	63.09c	\$89,926.	19.30c

way purchased 4 additional locomotives. Power is supplied by the Sao Paulo Light & Power Company.

The changes in traffic since electrification are significant. When electric operation began, in 1921, the schedule provided for 16 passenger trains and 50 freight trains (including two of mixed service). With increases in both passenger and freight traffic during electric operation, the schedule was changed to 20 passenger trains and 28 freight trains. The reduction in number of freight trains resulted

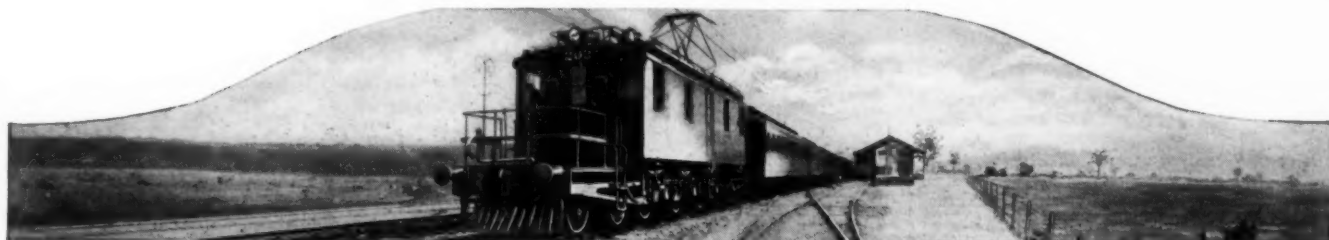
from increased tonnage per train and more regular movements of traffic.

Naturally, great savings are accomplished from the decreased train movements and the resulting reduction in expense of train and engine crews in the freight service as well as saving in stand-by losses over steam operation and the better economy of electric power.

Grades encountered reach 1.8 and 2 per cent, and are of sufficient length so that the average power regenerated amounts to 13.2 per cent. This is com-

AMERICAN LOCOMOTIVE COMPANY GENERAL ELECTRIC COMPANY

Paulista Electrification Results



Electric Locomotive Maintenance 1/3 that of Steam

COST OF LOCOMOTIVE REPAIRS AND HEAVY MAINTENANCE

	Steam		Electric	
	Total Cost 465,750 Train Miles	Per Train Mile	Total Cost 465,750 Train Miles	Per Train Mile
Labor	\$13,512.	2.90¢	\$6,250.	1.34¢
Material	18,303.	3.93	3,928.	0.84
Total	\$31,815.	6.83¢	\$10,178.	2.18¢

puted from the following tabulation of power consumption and power regenerated at the locomotives for one month's service. Less than 5 per cent of this energy,

Class of Service	Kw-hr. Motoring	Kw-hr. Regenerating	Per Cent Regenerating
Passenger	303,510	30,505	10.05
Freight	363,595	57,530	15.82
Total	667,105	88,035	—
Average per cent regeneration	13.2		

that is, of the total regenerated power, is returned to the power company's lines,

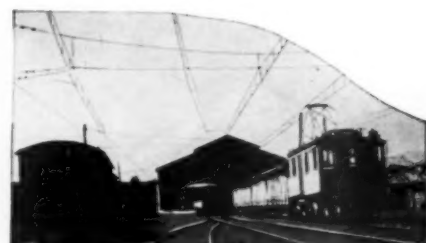
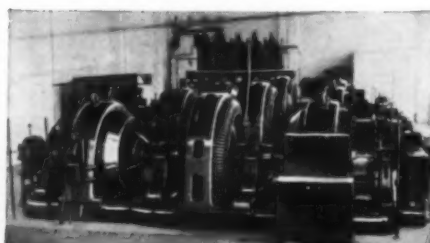
showing that the railway obtains almost full benefit from the regeneration. In addition to this economy, the saving in maintenance of braking apparatus is considerable.

Of especial interest is the comparison of power measured at the locomotives to that measured on the power company's lines. This ratio is .837, which shows the high economy of electric power that is made possible by regeneration.

The costs used here are based on the average rate of exchange over the period

AMERICAN LOCOMOTIVE COMPANY GENERAL ELECTRIC COMPANY

Paulista Electrification Results



Efficiency of Electric Operation—83%
Average Per Cent Regeneration—13.2

COST OF OPERATING AND MAINTAINING ELECTRIC SYSTEM

	10 Miles of 88,000-volt Transmission Line		71.4 Miles of Secondary Distribution System	
	Total Cost 465,750 Train Miles	Per Train Mile	Total Cost 465,750 Train Miles	Per Train Mile
Labor.....	\$1,865.	0.40¢	\$4,271.	0.91¢
Material.....	272.50	0.06	559.50	0.12
Total.....	\$2,137.50	0.46¢	\$4,830.50	1.03¢

for which the costs are figured. These costs are exact, but not strictly comparable with the cost of service in this country, due to the varying exchange. They are intended only to give a comparison of results with electric operation versus steam.

In consequence of the savings made by the initial installation, the Paulista Railway is electrifying 35 additional route miles of single track. For this extension the entire equipment was ordered from

General Electric Company
Schenectady, N. Y.

the General Electric Company. This includes a new substation of 4500-kw. ultimate capacity, together with high-tension and distribution equipment, also five 3000-volt direct-current switching locomotives, which, like the larger units, were built jointly by the General Electric and American Locomotive companies.

Contracts for the Paulista electrification are carried out by the International General Electric Company through the General Electric S. A. of Brazil.

American Locomotive Company
New York, N. Y.

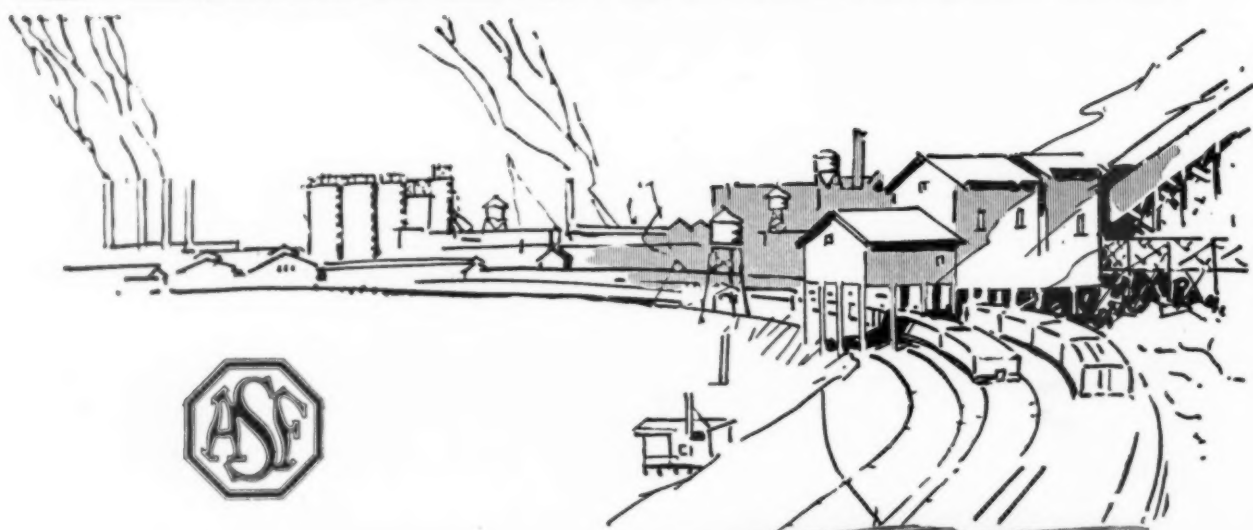
AMERICAN LOCOMOTIVE COMPANY
GENERAL ELECTRIC COMPANY

Shop Service

The equipment in the Pullman Car Shops is so complete that the Pullman Company is in position to comply instantaneously with the specifications of railroads. No matter what type of car, freight or passenger, is desired, the Pullman organization insures the highest grade of material and workmanship.

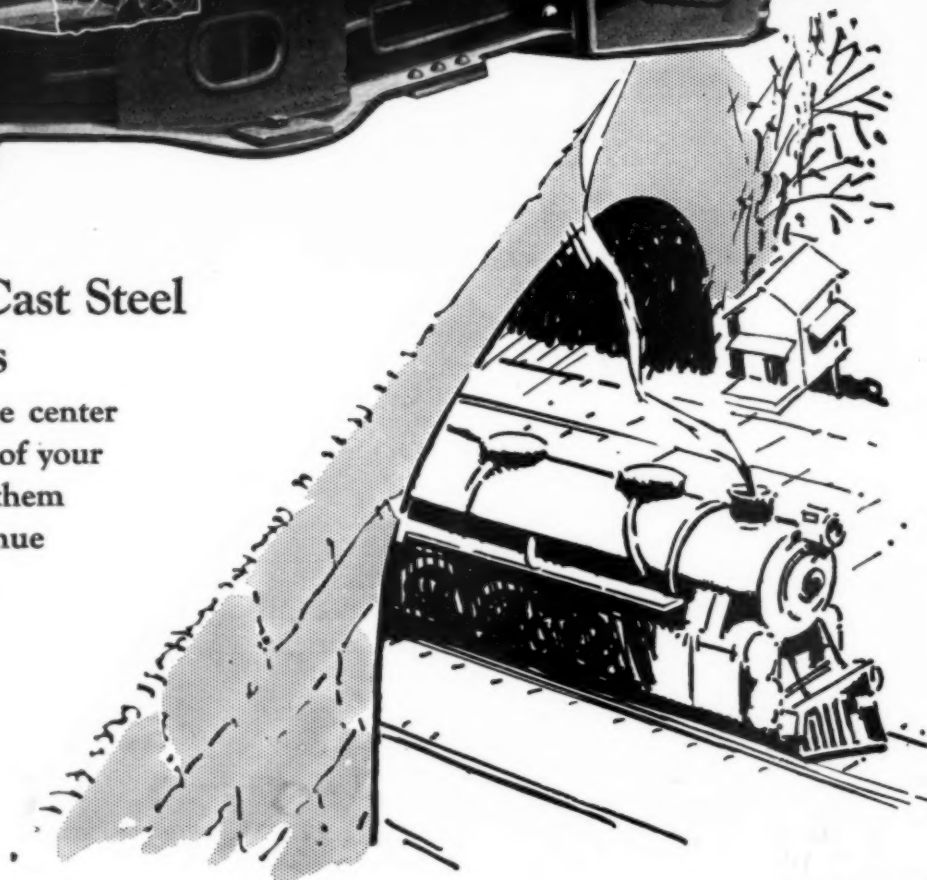
THE PULLMAN COMPANY
Chicago, Illinois

AMERICAN STEEL FOUNDRIES



Economy Cast Steel Draft Arms

will reinforce the center
sill construction of your
cars and place them
back in the revenue
producing class.



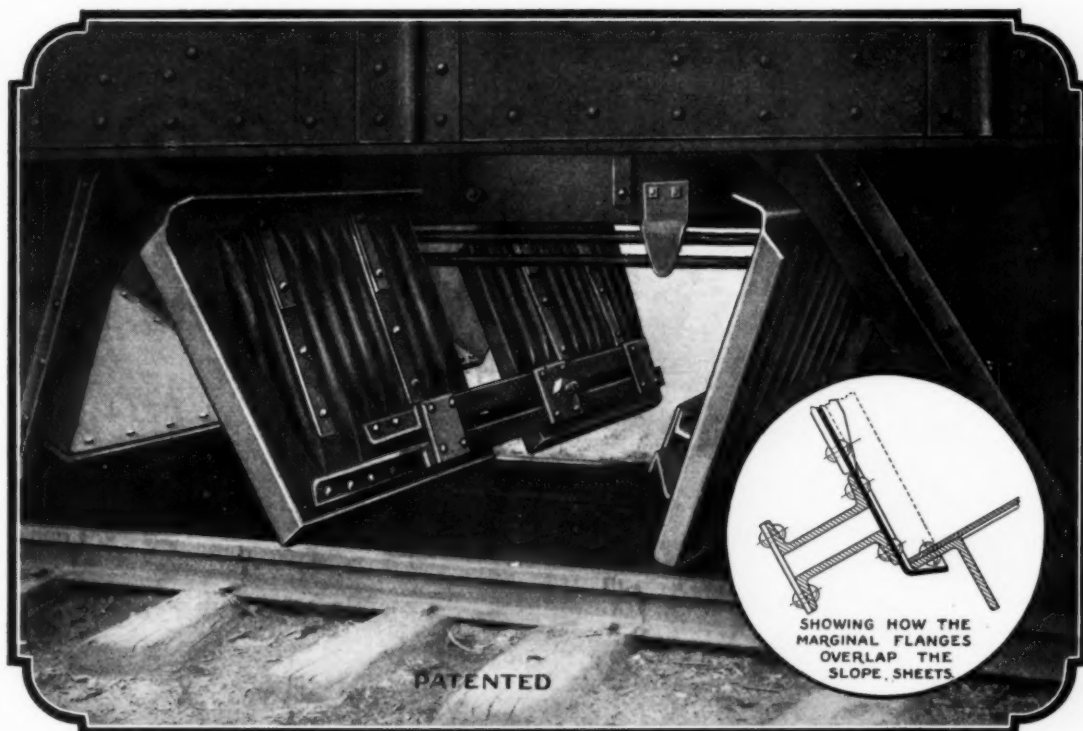
NEW YORK

CHICAGO

ST. LOUIS

AJAX

CORRUGATED DOORS FOR HOPPER AND GONDOLA CARS



AJAX CORRUGATED HOPPER DOORS, reinforced by corrugations and marginal flanges, stand up under severe usage, absorb sharp concentrated blows, retain their shape and permit the operating mechanism to close the doors properly. Keep the car in service longer and reduce maintenance costs.

The side and bottom marginal flanges overlap the edges of the slope sheets, and even though the doors are not tightly closed, prevent loss of granular lading.

The marginal flanges are slightly flared out so as to make the doors easy to close and to prevent the accumulation of acid forming deposits, and the corrugations are turned up and run in the direction of the load in dumping so that there are no pockets to collect moisture.

THE INCREASED STIFFNESS OF CORRUGATED DOORS will hold them in shape long after corrosion has weakened flat plate doors to the point where they will give way.

Union Metal Products Company

Park-Lexington Building
NEW YORK

Montreal
Washington
Philadelphia
Richmond

Railway Exchange Building
ST. LOUIS

Kansas City
Houston
Denver
San Francisco

Great Northern Building
CHICAGO

CHICAGO-CLEVELAND CAR ROOFING CO.



Let Us Reason Together

Passenger cars have rigid roofs.

Why not equip freight cars with Rigid All Steel Roofs?
It is logical in both cases.

Modern car building practice calls for rigidity in the UNDER-FRAME and rigidity in the OVERFRAME (the roof).

The RIGID ALL STEEL VIKING ROOF spells progress over the old flexible all steel type.

The "Magic" Clamps of the VIKING ROOF did away with the necessity of Rivets and made possible a RIGID ROOF, easy of application.



The Magic Clamp

RIGID WITHOUT RIVETS
VIKING
ALL-STEEL ROOF

CHICAGO-CLEVELAND CAR ROOFING CO.

BRANCHES

New York
Washington, D. C.
St. Louis
St. Paul
Montreal
Warren, Ohio

General Offices

25 E. JACKSON BLVD.
CHICAGO

OUR PRODUCTS

Inside Roofs
Outside Roofs
All Steel Roofs
All Steel Ends
Composite Ends
Steel Carlines

Safety, Economy, Mileage, Efficiency

Four sound reasons
why so many exacting
buyers invariably specify

GARY **FORGED**
 ROLLED STEEL **WHEELS**

Specially adapted for Freight
and Passenger car service

Illinois Steel Company

General Offices, 208 S. La Salle Street

Chicago Illinois



Certificate Holders for the Quarter Ending March 31st, 1924

Albany Malleable Iron Co.	Voorheesville, N. Y.
Albion Malleable Iron Co.	Albion, Mich.
American Chain Co.	Bridgeport, Conn.
American Malleable Castings Co.	Marion, O.
American Malleable Co.	Lancaster, N. Y., and Orono, Mich.
Budger Malleable & Mfg. Co.	South Milwaukee, Wis.
Baltimore Malleable Iron & Steel Casting Co.	Baltimore, Md.
Belle City Malleable Iron Co.	Racine, Wis.
Chain Bolt Co.	Milwaukee, Wis.
Chicago Malleable Castings Co.	West Pullman, Chicago, Ill.
Columbus Malleable Iron Co., The	Columbus, O.
Danville Malleable Iron Co.	Danville, Ill.
Dayton Malleable Iron Co.	Dayton, O., Boston, O., and Canton, O.
Deafor Malleable Iron Co.	Decatur, Ill.
Devlin Mfg. Co., Thomas	Philadelphia, Pa.
Easton Malleable Iron Co., The	Naugatuck Malleable Iron Works, Naugatuck, Conn.; Bridgeport Malleable Iron Works, Bridgeport, Conn.; Troy Malleable Iron Works, Troy, N. Y.; Wilmington Malleable Iron Works, Wilmington, Del.; Vulcan Iron Works, New Britain, Conn.
Erie Malleable Iron Co.	Erie, Pa.
Federal Malleable Co.	West Alle, Wis.
Fort Pitt Malleable Iron Co.	Pittsburgh, Pa.
Fraser & Jones Co.	Syracuse, N. Y.
General Electric Co.	Erie, Pa.
Gleason Malleable Corporation	Waukegan, Wis.
Illinois Malleable Iron Co.	Chicago, Ill.
Iowa Malleable Iron Co.	Fairfield, Ia.
Kalamazoo Malleable Iron Co.	Kalamazoo, Mich.
Lacuna Car Co.	Lacuna, N. H.
Lakeside Malleable Castings Co.	Racine, Wis.
Lucas Iron Co.	Indianapolis, Ind.
Martin Malleable Iron Works	Marion, Ind.
Milwaukee Malleable Iron Co.	St. Charles, Ill.
National Malleable & Steel Castings Co.	Cleveland, O., Chicago, Ill., Indianapolis, Ind., Toledo, O., E. St. Louis, Ill.
Northern Malleable Iron Co.	St. Paul, Minn.
Northwestern Malleable Iron Co.	Milwaukee, Wis.
Peoria Malleable Castings Co.	Peoria, Ill.
Pittsburgh Malleable Iron Co.	Pittsburgh, Pa.
Rhode Island Malleable Iron Works	Hillgrove, R. I.
Rockford Malleable Iron Works	Rockford, Ill.
Ross-Mechan Foundries, The	Chattanooga, Tenn.
St. Louis Malleable Casting Co.	St. Louis, Mo.
Saginaw Malleable Iron Co.	Saginaw, Mich.
Shawmut Co., The	South Milwaukee, Wis.
Superior Steel Castings Co.	Benton Harbor, Mich.
Springfield Co., T. H., The	Rochester, N. Y.
Temple Malleable Iron & Steel Co.	Temple, Pa.
Terre Haute Malleable & Mfg. Co.	Terre Haute, Ind.
Trenton Malleable Iron Co., The	Trenton, N. J.
Union Malleable Iron Co., The	E. Moline, Ill.
Vermilion Malleable Iron Co.	Hopkinton, Ill.
Warner Malleable Castings Co.	Hammond, Ind., and Bolot, Wis.
Warren Tool & Forge Co.	Warren, Ohio
Webster Mfg. Co., The	Chicago, Ill.
Wisconsin Malleable Iron Co.	Milwaukee, Wis.
York Mfg. Co.	York, Pa.
Zanesville Malleable Co.	Zanesville, O.

High Yield Point is what the Engineer Wants

Engineers responsible for the design of equipment in which vital parts must withstand shock and abuse freely use Certified Malleables because of their high elastic limit (yield point) compared to other ferrous castings.

Yield point of Certified Malleables is 65% of ultimate strength
Yield point of Steel Castings is 45% of ultimate strength

Certified Malleables all average higher than 50,000 pounds tensile strength with yield point of 33,000 pounds or higher. This is about 6000 pounds or 22% higher than Class A Steel Castings and exceeds by a considerable margin the yield point of medium and soft Class B Steel Castings, having tensile strengths of 70,000 and 60,000 pounds respectively.

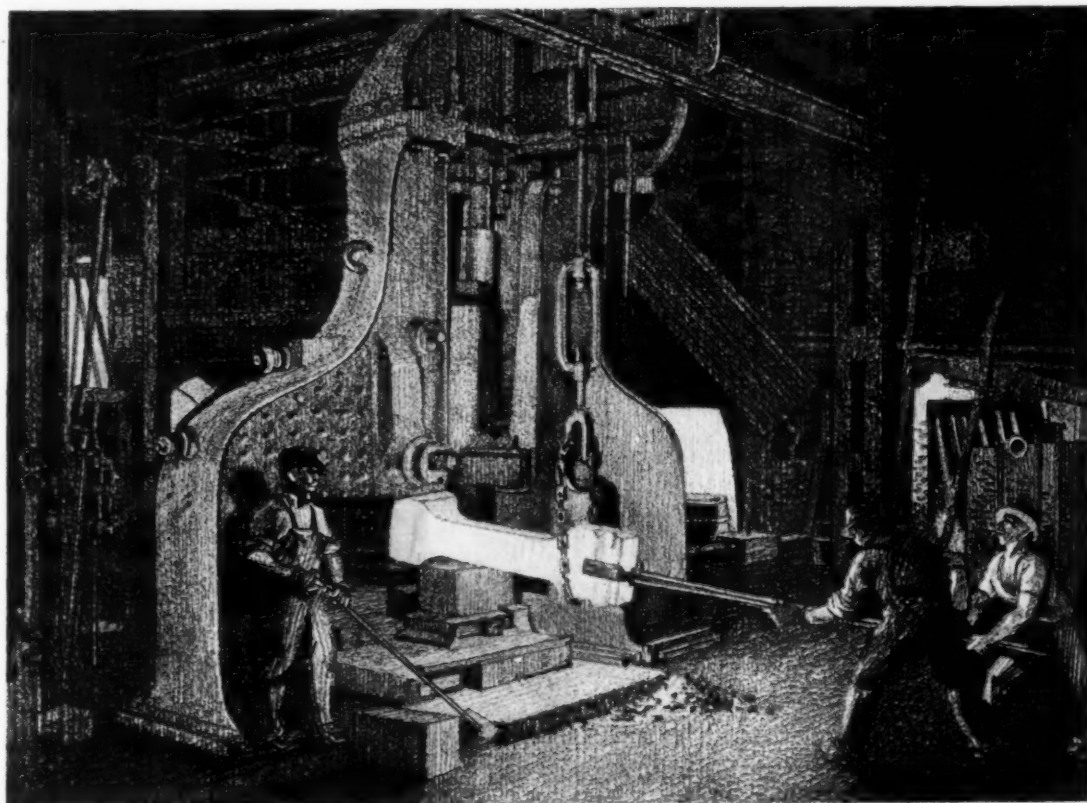
Along with their high elastic limit, Certified Malleables machine more easily and economically than other ferrous castings. After annealing, all Certified Malleables contain minute particles of free temper carbon or graphite which serves as a natural lubricant for the cutting tool, while freedom from blow holes and hidden defects prevents "rejects" after expensive machining labor has been expended.

AMERICAN MALLEABLE CASTINGS ASSOCIATION
UNION TRUST BUILDING
CLEVELAND, OHIO



CERTIFIED-MALLEABLE CASTINGS

STANDARD STEEL



"Standard" is awake to the burden that is being placed upon Axles, Rods and Pins in these days of maximum loads. We have, therefore, specialized upon these "quality forgings."

The product is carefully watched all through the course of manufacture. Each department realizes the importance it plays in co-operating to uphold the reputation of the Company. In buying "Standard quality forgings" you are assured of the best.

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

BRANCH OFFICES

CHICAGO
ST. LOUIS
NEW YORK

HOUSTON, TEXAS
PORTLAND, ORE.

RICHMOND, VA. BOSTON
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PITTSBURGH, PA.
LOS ANGELES, CAL.
MEXICO CITY, MEX.

WORKS: BURNHAM, PA.



HCR BROADCASTING



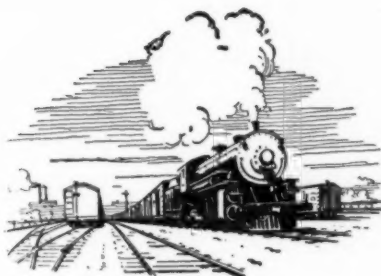
TUNE IN

and Get the Rest of the Story

For detailed
description see
**CAR BUILDERS
CYCLOPEDIA**
1922 Edition

HUTCHINS CAR ROOFING COMPANY
DETROIT MICHIGAN
ESTABLISHED 1880





These Railroads Are Reducing the Cost of Transportation

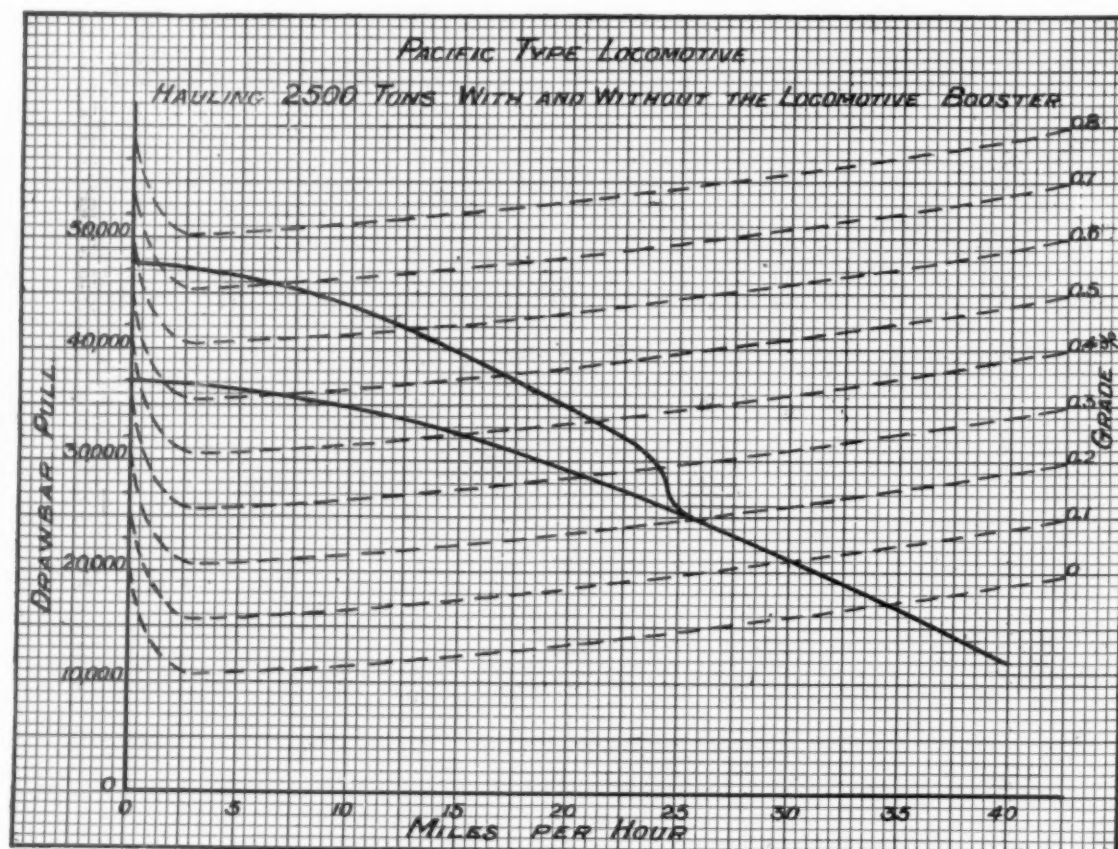
ONE railroad has found it possible to increase its freight train loads, also to increase freight train speeds without corresponding increase of locomotive weights.

This is accomplished by carefully designed locomotives with every capacity increasing factor coordinated with every other factor to produce a balanced, powerful, flexible power plant.

Another railroad has put into service a passenger locomotive with over 40% more power than present types of engines of the road without corresponding increase in weight.

The limit of steam locomotive capacity, efficiency and economy has not been reached or even nearly approached. Not even in these new locomotive designs.

G. M. BASFORD COMPANY
17 East 42nd Street
New York City



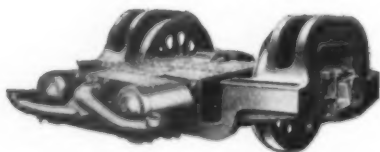
Why Boosters Speed Operation

Increased speed of train movement is considered by many roads as the greatest benefit of The Locomotive Booster.

This chart explains why.

It shows that while a Pacific type locomotive hauling a 2500 ton train can surmount a 0.5% grade at 6 miles per hour, when The Locomotive Booster is cut in, the steady train speed up the grade increases to 16 miles per hour.

It also shows that on a 0.6% grade the train would stall without the Booster, while with the Booster, a speed of 12.5 miles per hour could be steadily maintained.



THE LOCOMOTIVE BOOSTER
(Applied on trailing truck)

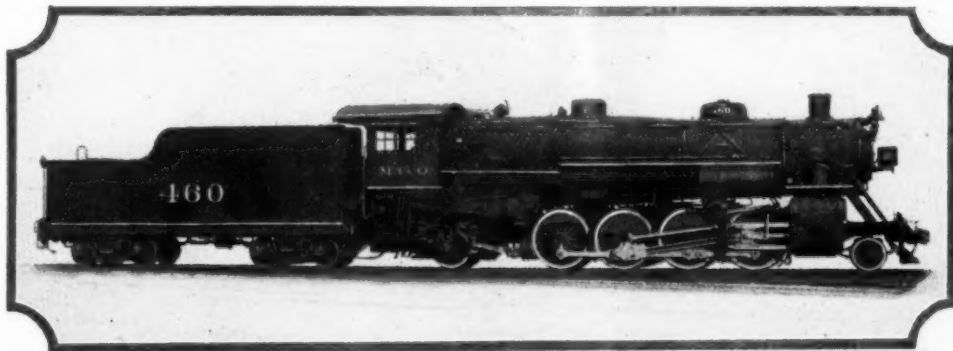
These charts are constructed on numerous dynamometer tests and represent actual performance

Franklin Railway Supply Company, Inc.

17 East 42nd Street, New York

332 So. Michigan Avenue Chicago, Ill. 1209-12 Praetorian Bldg. Dallas, Texas. 774 Monadnock Bldg. San Francisco, Cal.

Franklin Railway Supply Company of Canada, Limited, Montreal
Export Department—International Railway Supply Co.—30 Church St., New York



New Locomotives Are Needed

IF books could be kept for individual trains and the facts of performance and of delay in detail could be shown, every business man depending upon transportation would gladly help railroad financing.

If it is a single track road, there is an opposing train at the next siding waiting to use the track—

If it is a double track road, there is

a slower train at the next siding, waiting to use the next passing track.

In both cases the locomotive that will get its train out of the way of other traffic and on its way to be paid for is the money maker.

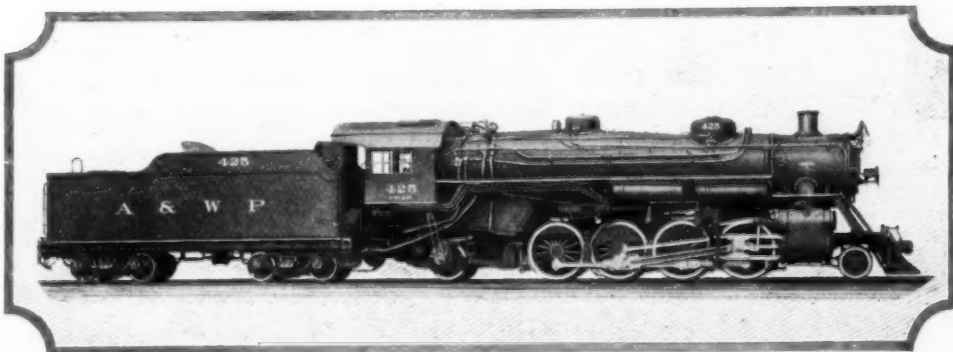
This means new locomotives of greater power and speed—to replace the old ones that are less effective.

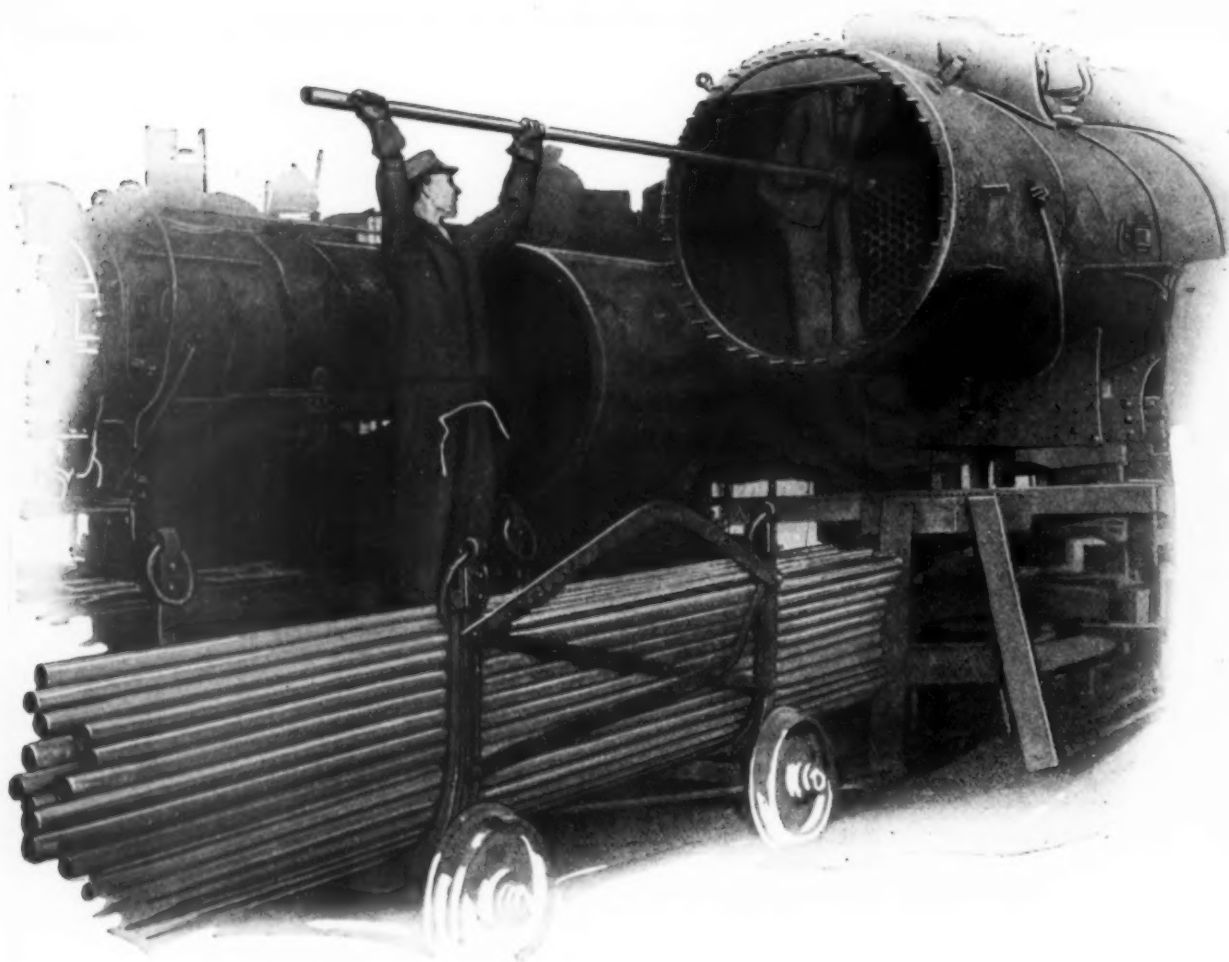
LIMA LOCOMOTIVE WORKS

INCORPORATED

Lima, Ohio

17 East 42nd St., New York





Cutting Tube Replacements By Two-Thirds

ROADS using charcoal iron boiler tubes require 10% or less new tubes at each re-tubing period, while roads using other tubes require 30% or more new tubes of the total applied.

This conclusion is the result of an intensive six months' study of tube conditions covering fourteen representative railroad shops.

Here is true proof of the saving effected by charcoal iron boiler tubes.

Let replacement tubes be Parkesburgs and watch the improvement in your tube records as Parkesburgs make themselves felt.

Put Parkesburgs to the test of your worst water conditions. See how they outlast less-resistant tubes of other material.



How Parkesburg Charcoal Iron Boiler Tubes are made, why they last longer than tubes of other material, and a number of actual instances of long and economical tube service are interestingly told in "Parkesburg Tubes". Send for a copy.

The Parkesburg Iron Company

Parkesburg, Pa.

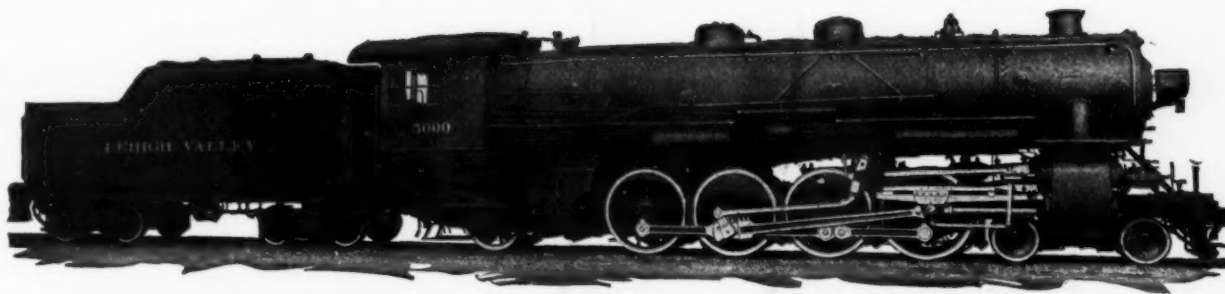
BRANCH OFFICES

*New York, 30 Church Street—Boston, Oliver Building—Chicago, Fisher Building
Philadelphia, Commercial Trust Building—St. Louis, Security Building
San Francisco, Rialto Building—Montreal, New Birks Building
St. Paul, 906 Merchants Bank Building*

EXPORT AGENTS

Wonham, Bates & Goode Trading Corporation, New York

Showing the Way



THREE CYLINDER LEHIGH VALLEY TYPE LOCOMOTIVE BUILT FOR LEHIGH VALLEY RAILROAD.

Weight on Driving Wheels, 246,500 pounds; Weight of Engine, 369,000 pounds; Three Cylinders, 25 x 28 inches; Diameter of Driving Wheels, 69 inches; Boiler Pressure, 200 pounds; Maximum Tractive Power, 64,700 pounds.

Three Cylinder Locomotive

A more uniform turning movement permitting greater tractive power per pound of weight on drivers.

Reduction in piston thrust due to smaller size of piston used.

Reduction in reciprocating weight per individual cylinder with corresponding reduction in counterbalance and hammer blow on rail.

Increased and steadier draft due to six exhaust impulses instead of four.

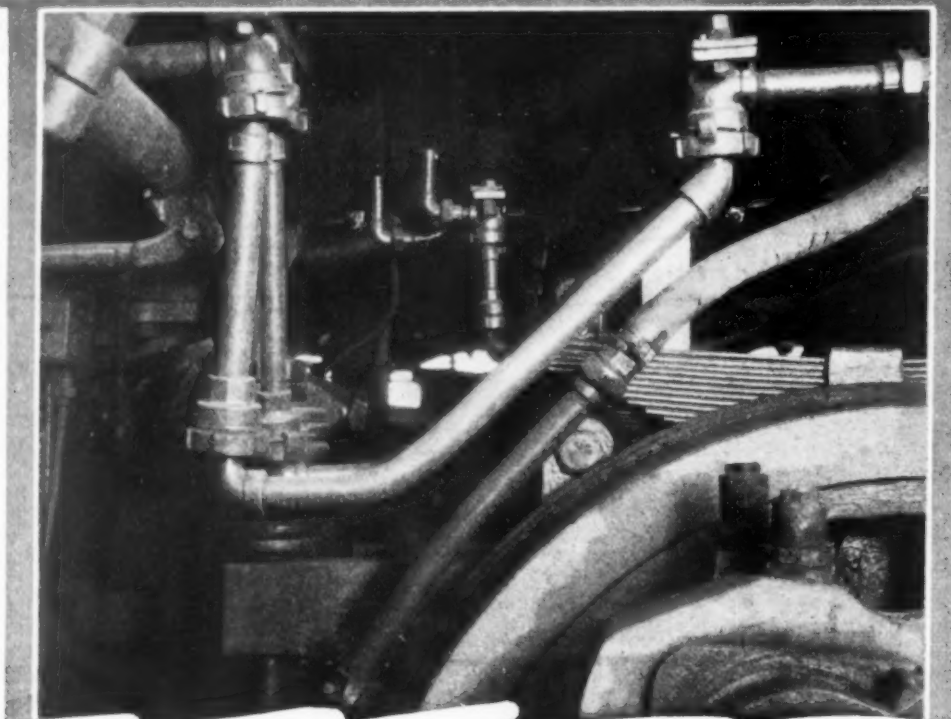
Increased tonnage per pound of weight on drivers.

AMERICAN LOCOMOTIVE COMPANY

30 Church Street

New York City

Barco All Metal 3V Connections



Provide dependable pipe line connections between high and low pressure units on Mallets

MUCH depends on the pipe line connections between high and low pressure sections on Mallet locomotives.

They are subjected to the hardest kind of service in their exposed position; they must withstand alternate freezing and thawing, as well as high internal pressures and above all else they must be perfectly flexible.

Barco All Metal 3V Connections fulfill every

one of these requirements—that's why they are being extensively used on Mallet locomotives in preference to non-metallic equipment, which lasts but a short time and is a constant source of expense for maintenance and renewal.

Barco Connections are permanent. They go from shopping to shopping without attention—and will last the life of the locomotive itself. Apply them on all your Mallets.

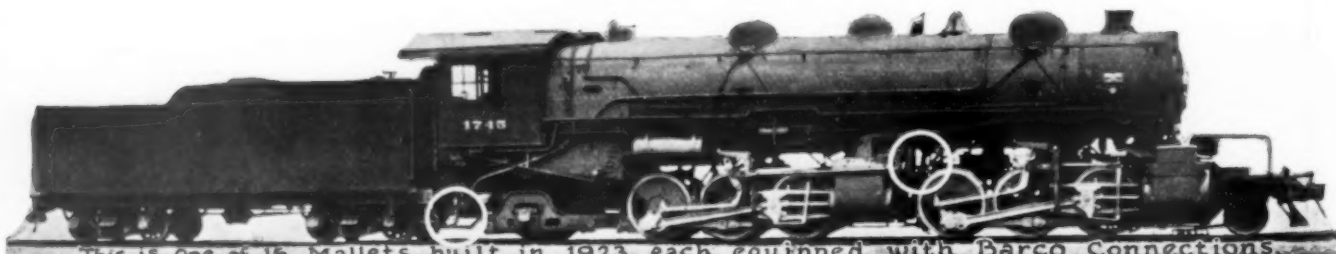
Barco Manufacturing Company

1801 Winnemac Ave., Chicago, Ill.

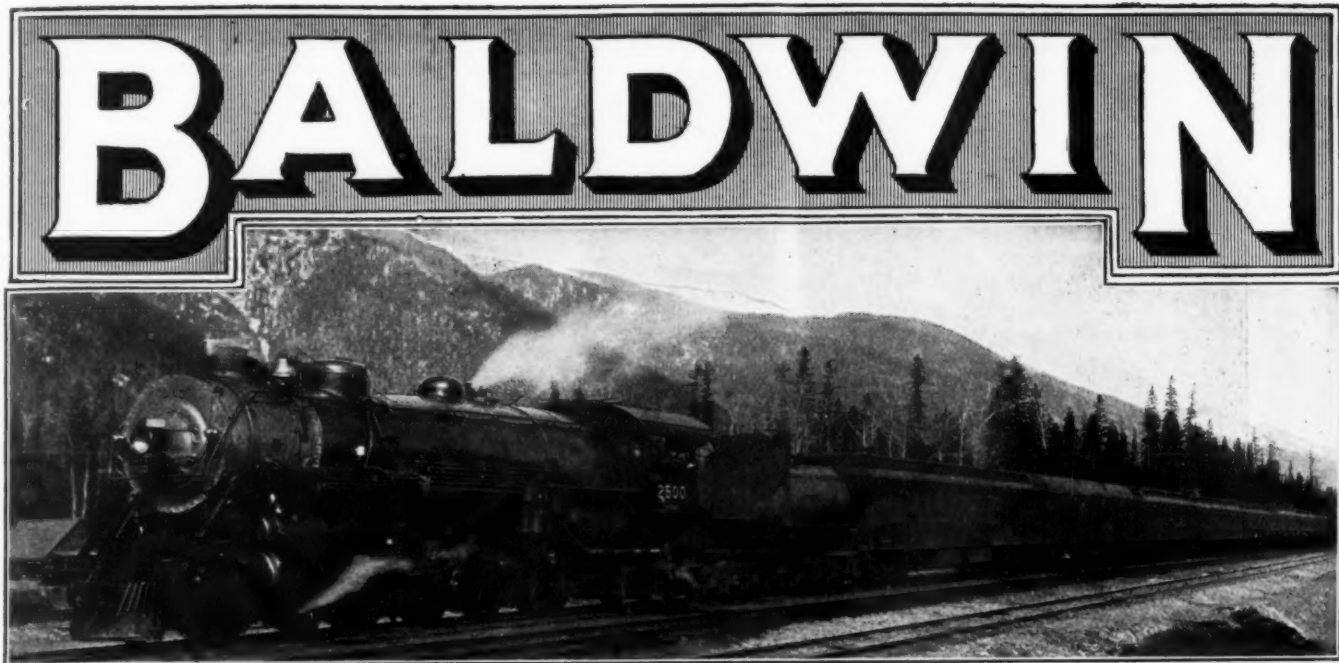
In Canada
Montreal-Toronto

THE HOLDEN CO., LTD.

In Canada
Winnipeg-Vancouver



This is one of 16 Mallets built in 1923, each equipped with Barco Connections.



One of the Baldwin Mountain Type Locomotives in Mountainous Country

Mountain Type Locomotives on The Great Northern Meet Difficult Operating Conditions With Success

SINCE 1906 the Great Northern has placed a large number of Baldwin locomotives in passenger and freight service.

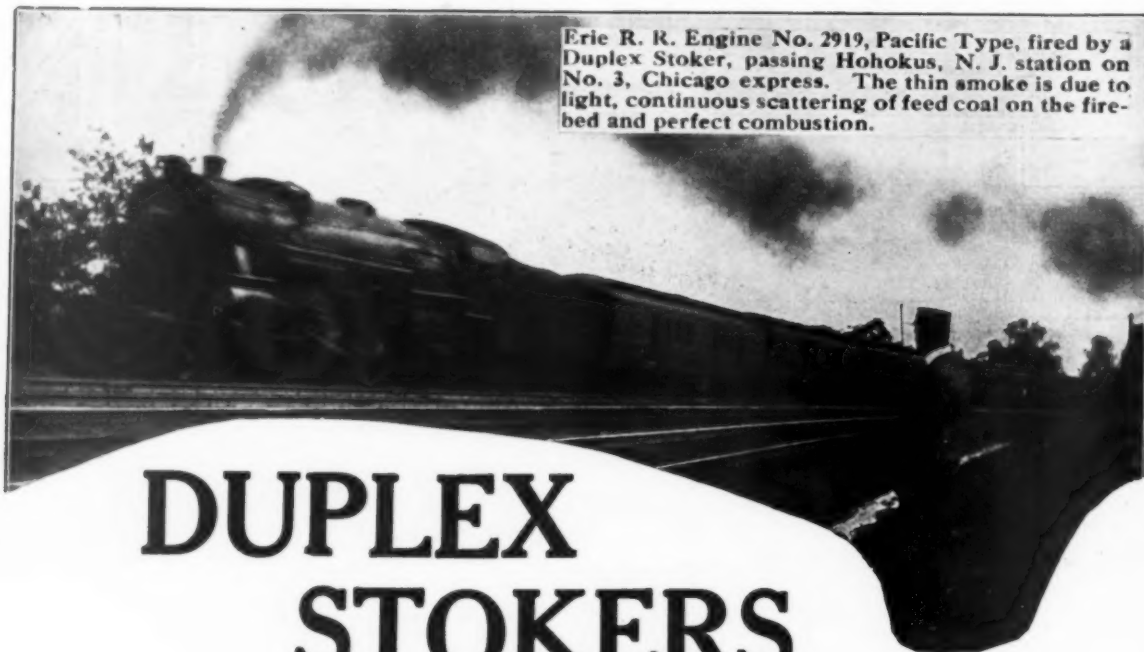
The heaviest passenger locomotives of eighteen years ago were of the Pacific type, weighing 227,000 pounds and carrying 151,000 pounds on drivers. These locomotives developed a tractive force of 37,700 pounds and represented, at that time, the last word in heavy passenger power.

The new Baldwin Mountain type locomotives, built in 1923, one of which is illustrated above, weigh 357,000 pounds, with 238,000 pounds on drivers, and develop a tractive force of 54,830 pounds. This represents an increase in tractive force of 45 per cent as compared with the earlier design. Measured in horsepower output, the increase is even greater, as the new locomotives, due to improved design and modern equipment, show an efficiency considerably beyond those built in 1906.

In addition to the notable success achieved by these new locomotives, particular interest is centered in the one illustrated, as it represents the 57,000th locomotive built by these Works.

THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA

LOCOMOTIVES



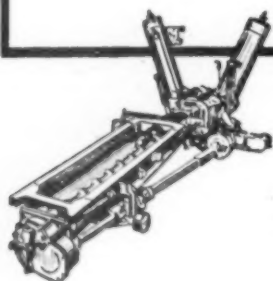
Erie R. R. Engine No. 2919, Pacific Type, fired by a Duplex Stoker, passing Hohokus, N. J. station on No. 3, Chicago express. The thin smoke is due to light, continuous scattering of feed coal on the fire-bed and perfect combustion.

DUPLEX STOKERS

—a remarkable development
of long-distance passenger
runs on the Erie R. R.

6774 of our Stokers
Now in Service—
5600 of them are
DUPLEXES

—Because the
Promise has been
Performed



Using Duplex Stoker-fired locomotives, the Erie Railroad is operating through passenger trains Nos. 1000 and 1001 the entire distance of 425 miles between Jersey City and Buffalo, in regular daily service, without changing engines.

No finer tribute to the splendid firing qualities of Duplex Stokers can be found than that expressed by their use in this and similar cases where one of the most important factors involved is a thin, steady, hot, clean fire.

The Erie has also materially extended its locomotive runs by using Duplex Stoker-fired power on passenger trains Nos. 3 and 4, between New York and Marion, Ohio. These trains cover the 730 miles with only two changes of locomotives. One locomotive is used from New York to Hornell, 332 miles; one locomotive from Hornell to Meadville, 184 miles; one locomotive from Meadville to Marion, 213 miles.

Duplex Stokers meet such operating conditions satisfactorily.

LOCOMOTIVE STOKER CO.

Main Office and Works - 30 General Robinson St., West,
Northside, PITTSBURGH, PA.

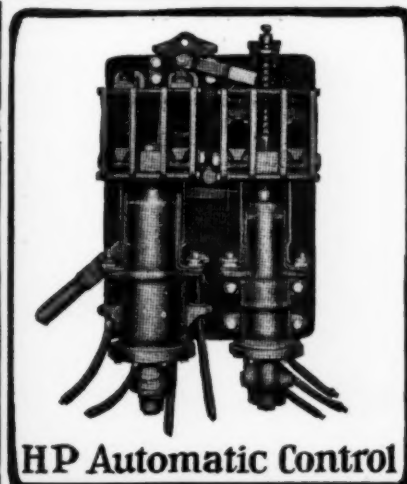
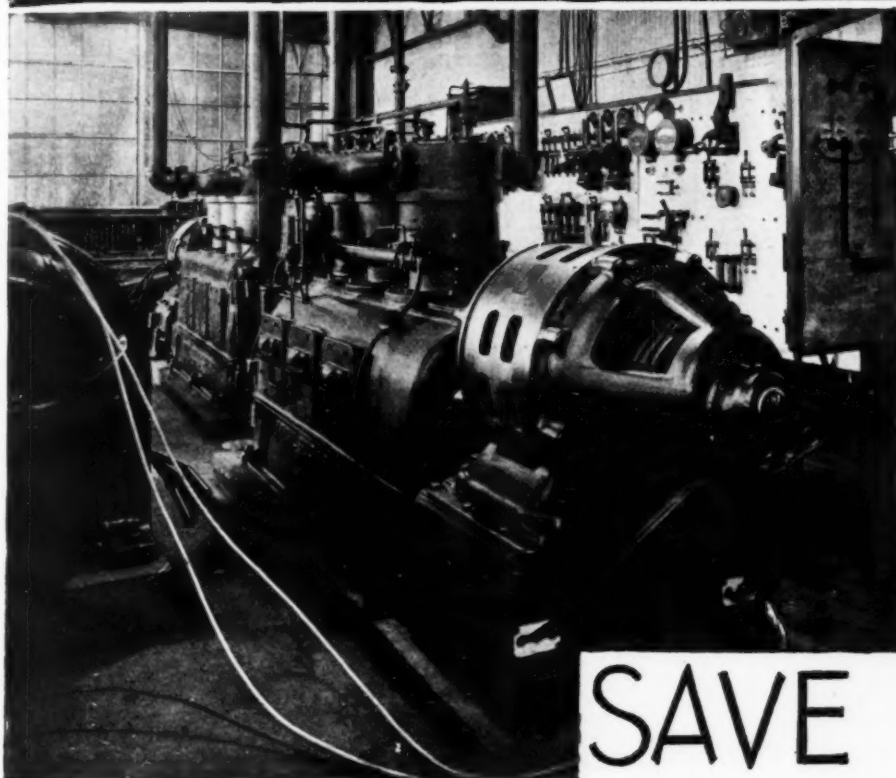
Westinghouse Bldg.
150 Broadway
NEW YORK

Munsey Bldg.
1329 "E" St., N. W.
WASHINGTON

Railway Exchange Bldg.
80 E. Jackson Blvd.
CHICAGO

WORLD'S LARGEST MANUFACTURERS OF LOCOMOTIVE STOKERS

Coal Pushers for Hand-fired Locomotives



The illustration on the left shows an installation in which two Westinghouse industrial air compressors of the 3VS type are used to supply the compressed air requirements of an up-to-date power plant.

SAVE POWER

Westinghouse Motor-Driven Air Compressors for Railroad Shops and Yards

THERE is necessarily a close relationship between Air Brakes and Air Compressors, and in the development of one we have had an exceptional opportunity to work out various advanced ideas for application to the other.

For many years we have manufactured a complete, high-grade line of motor-driven compressors for general industrial service, hundreds of which are used in railroad shops, yards, power houses, pumping stations, etc. The compressors generally preferred for these purposes are the 3VS and 3VD

types, furnished for various capacities from 150 to 700 cu. ft. displacement.

These compressors are entirely automatic in operation. They start and stop themselves as requirements demand. Since they are running only part time, they consume far less power than would otherwise be used. They occupy minimum floor space, run without vibration, possess a system of positive lubrication and are shipped complete with motor attached, ready for quick installation and immediate operation. An illustrated catalog will be mailed on request.



WESTINGHOUSE AIR BRAKE CO.

GENERAL OFFICES AND WORKS, WILMERDING, PA.

NEW YORK

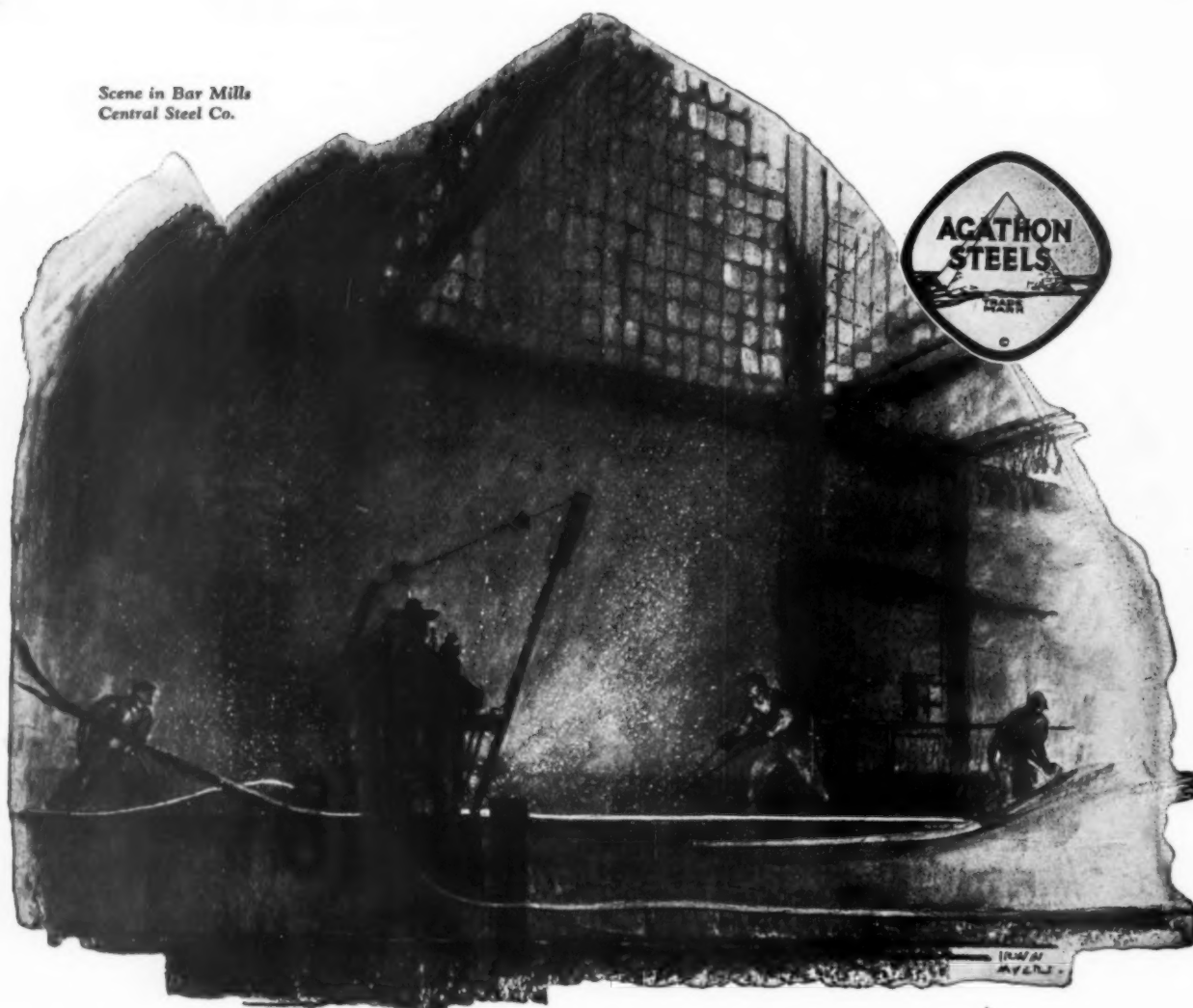
WASHINGTON

CHICAGO

ST. LOUIS

SAN FRANCISCO

Scene in Bay Mills
Central Steel Co.



We Can Solve Your Problem—If It's IN the Steel

We have a daily production in all kinds of Agathon Alloy Steels such as—

Nickel, Chrome-Nickel, Ume, Molybdenum, Chrome-Molybdenum, Nickel - Molybdenum, Vanadium, Chrome-Vanadium, Chromium, etc.

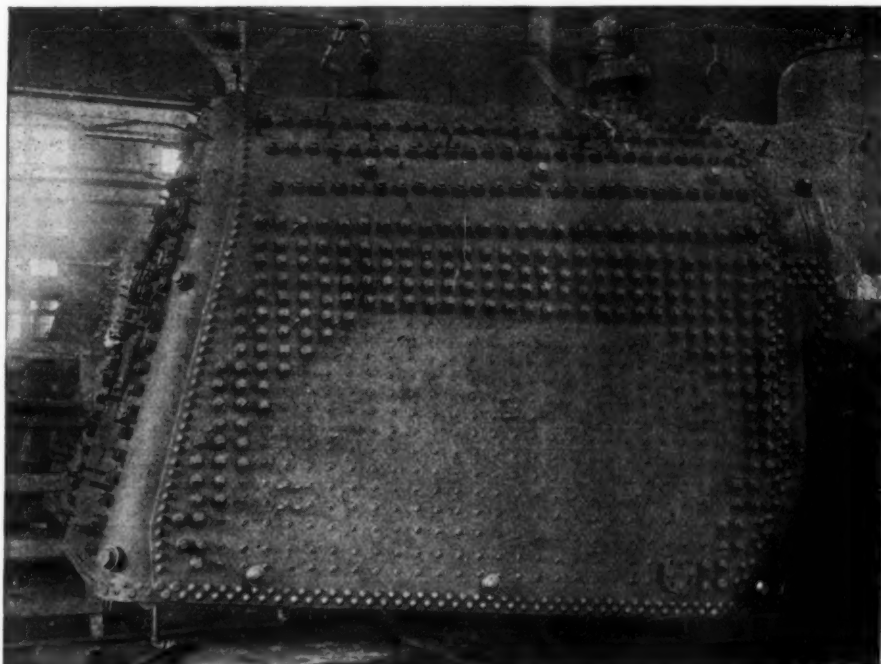
Deliveries in Blooms, Billets, Slabs, Bars, Hot Rolled Strips, etc.

Perhaps you require a steel of greater hardness, strength, density or adaptability to heat treatment than you are now using for locomotive parts such as piston rods, main and side rods, axles, crank pins, etc.

Our expert metallurgists and practical steel men, working in one of the best equipped chemical and physical laboratories in America, will gladly solve your problem in steel—without charge. Write us. Ask for interesting booklet.

The Central Steel Company, Massillon, Ohio

AGATHON ALLOY STEELS FOR LOCOMOTIVE PARTS



Illustrating the installation of F. B. C. Universal Welded Flexible Staybolts on ten locomotives of a Western Railroad.

The modern locomotive must be kept in service in order to produce earnings for the road—are you sure that your power is giving the greatest possible returns? How often is it necessary to shop the engines for minor repairs, such as a broken staybolt here and there?

Why not equip your engines with staybolts which will assure you of continuous service at a lower cost of upkeep, reduce your expenses for overhauling power and receive the normal mileage from every unit.

The F. B. C. Universal Welded Flexible Staybolt is a definite contributing factor in bringing about increased service from power under all conditions.

FLANNERY BOLT CO.

FLANNERY BLDG., 3528 FORBES ST.

PITTSBURGH, PA.

MORGAN



ONE OF THE ERECTING ROOMS IN LOCOMOTIVE SHOP 95' 0" x 900' 0"

Showing 58 Locomotives stripped and in process of repair. We have had 74 locomotives stripped in this building and in process of repair at one time.

MORE THAN 400 LOCOMOTIVES REPAIRED

It is with a great deal of satisfaction that we look back over our achievement of the past two years of more than 400 locomotives successfully repaired and rebuilt.

The same highly skilled and successful organization which has made our loco-

motive repair service a success, is here to serve you.

Twelve of the leading Railroads and five industrial plants have profitably taken advantage of our service.

We welcome your inspection of our plant to see what our possibilities are for you.

The Morgan Engineering Co. Alliance, Ohio

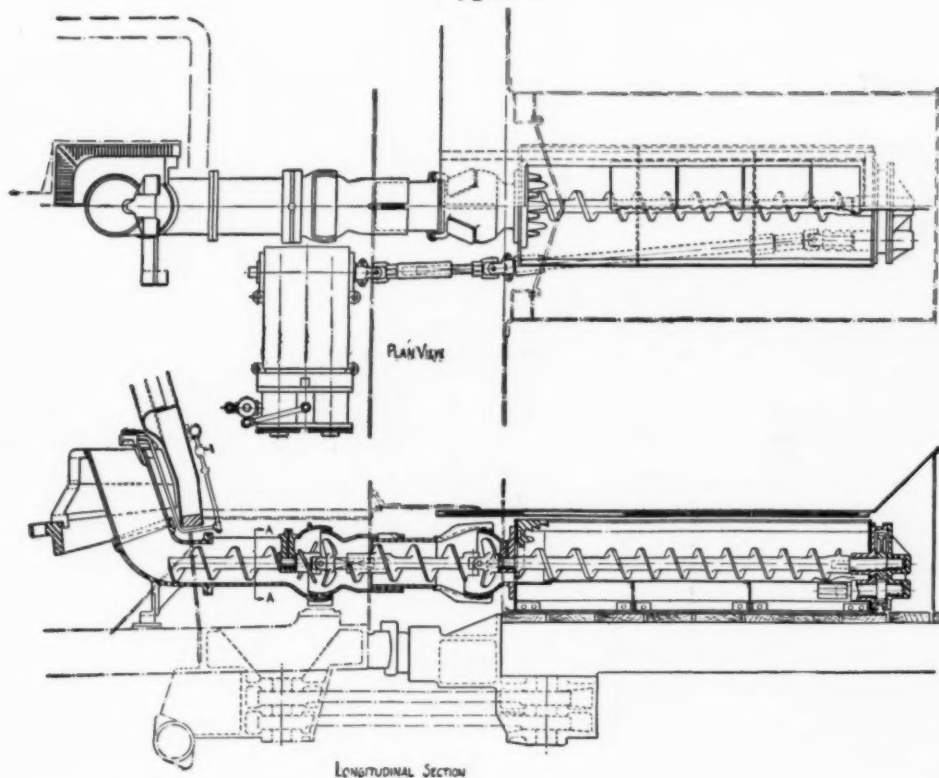
Designers, Manufacturers and Contractors
Electric Traveling Cranes, Rolling Mill Machinery
Ordnance, Steel, Shipbuilding and Forging Plants Complete
Rock Crushers, Special Machinery for Any Purpose

Chicago
122 So. Michigan Ave.

New York
120 Broadway
Pittsburgh
Oliver Bldg.

DUPONT-SIMPLEX STOKER

Type B



WE TESTED IT EVERY WAY WE COULD THINK OF

FEEDING coal from the tender to the firebox by a single horizontal screw without use of any elevating mechanism at one time suggested difficulties.

We have solved them.

Many months of effort resulted in developing a curved pipe section that works with even greater ease and success than any elevating device.

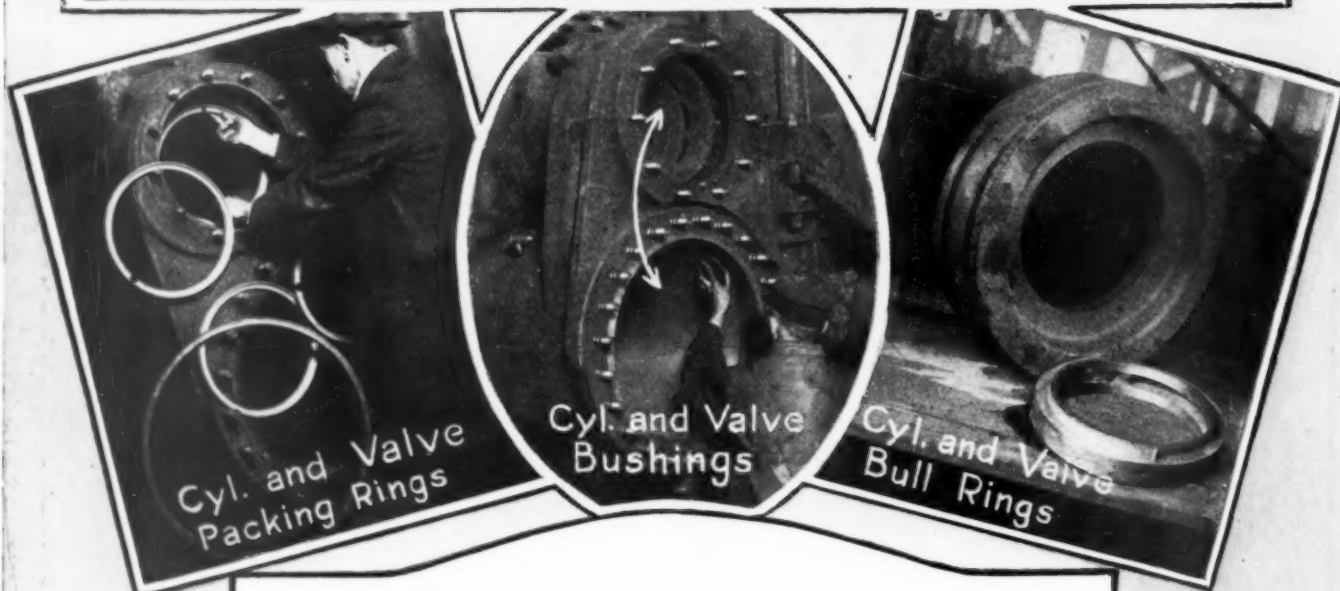
We have tested this every way we could think of with every kind of coal, wet and dry. We even packed it down with a sledge but we couldn't make it stick.

It pushed the coal through a vertical pipe extension more than two feet higher than any locomotive requires.

Come and see it work—we will put it to any test you can suggest that duplicates locomotive firing practice.

STANDARD STOKER COMPANY, Inc.

Grand Central Terminal, New York, N. Y.
McCormick Bldg., Chicago, Ill. duPont Bldg. Wilmington, Del.
Foundries and Works, Erie, Pennsylvania



For Fuel Conservation

ANY blow by the valves or piston heads means loss of power and waste of fuel—Wearing material inside the valves and cylinders determines the efficiency of your locomotives.

On your Pacifics loss of power means delayed train schedules—Waste of fuel is something you do not want on any type of locomotive.

Hunt-Spiller Gun Iron Packing Rings, Bushings and Bull Rings were specified for the valves and cylinders of all the above class of Pacifics.

There's a reason, of course—Tests made previously on other types of power proved not only greater savings in the use of fuel, but also a maximum service at a lower repair cost.

Made Only by

HUNT-SPILLER MFG. CORPORATION

W. B. Leach Pres. & Gen. Mgr.

J. G. Platt, Vice-Pres. & Sales Mgr.

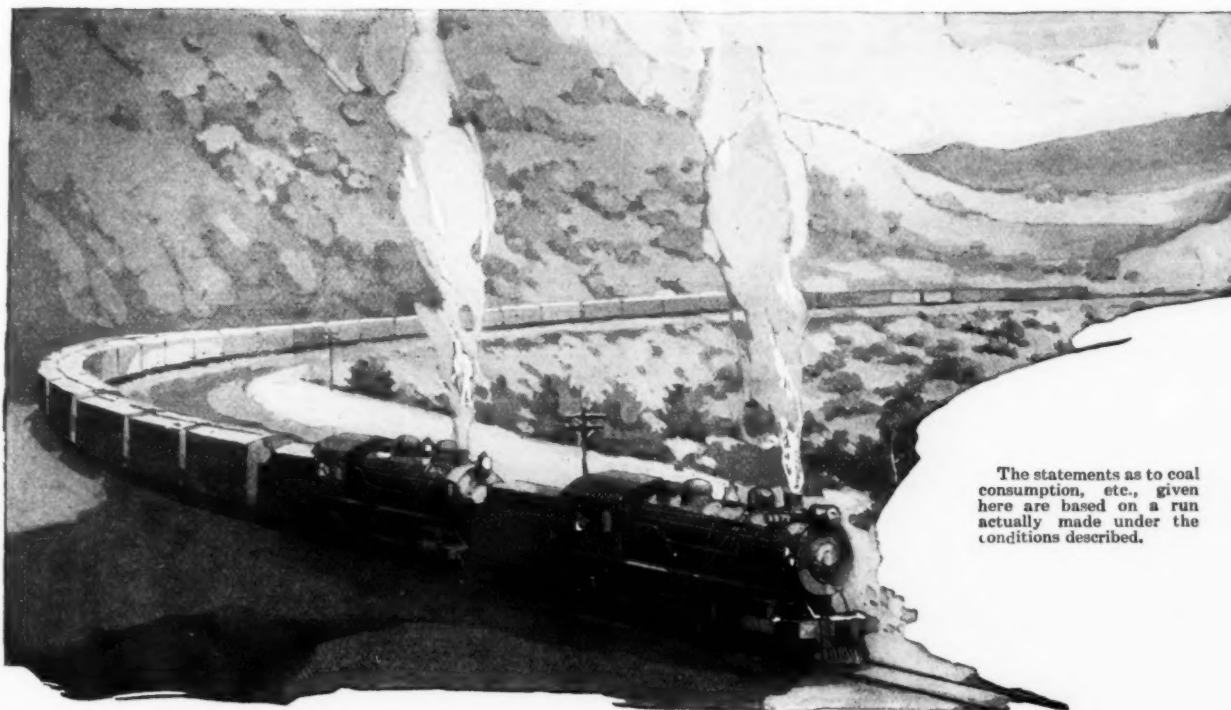
383 Dorchester Ave.

Office & Works

South Boston, 27, Mass.

HUNT-SPILLER GUN IRON

Worthington Locomotive Feed Water Heater



The statements as to coal consumption, etc., given here are based on a run actually made under the conditions described.

A Double Header Comparison

One night a double-header left X for Y and it just happened that this gave an excellent opportunity to judge the results of a Worthington heater. The first engine was injector fed, while the second was equipped with a Worthington heater.

The drag on this run was heavy and the tonnage full, so steam was worked all the way. At Z when part of the run was

over, the injector engine took seven tons of coal. The heater equipped engine required only five tons—two tons less to fill the tender.

Giving the head engine (injector fed) credit for more shifting and taking up slack, the saving of the second locomotive with the Worthington heater was between one and two tons of coal.

WORTHINGTON PUMP AND MACHINERY CORPORATION

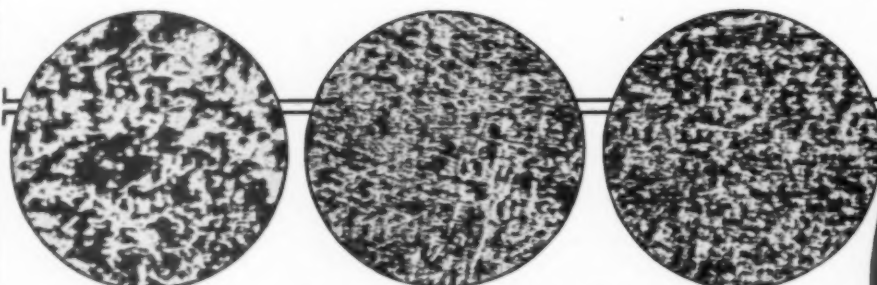
Executive Offices:—115 Broadway, New York City. Branch Offices in 24 Large Cities

W-282.8

WORTHINGTON



The Tale the Microscope Tells for Packing Ring Users



Each of these castings is made of the same Stewart-Jerome Metal—60% lead, 40% copper. The difference is in the method of casting.

Ordinary sand casting. Note the prevalence of large dendritic crystals.

Stewart-Jerome casting. Note absence of large dendritic crystals.

Stewart-Jerome casting normalized. This process closes the grain and makes the texture uniform.



*The finer the grain
the better the metal!*

Everyone is agreed on this fact.

The difficult problem has been to refine packing ring metal—to close up the grain without destroying the other essential properties.

Stewart has done it! How? With its famous Stewart-Jerome mixture, by improved casting methods—by *normalizing* the metal! Finer grain prolongs the life of every Stewart-Jerome Packing Ring.

Further, it is the one packing ring made with interchangeable joints for piston rods and valve stems using King Type Cups.

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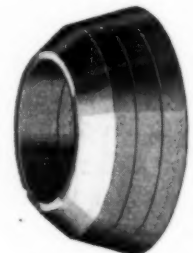
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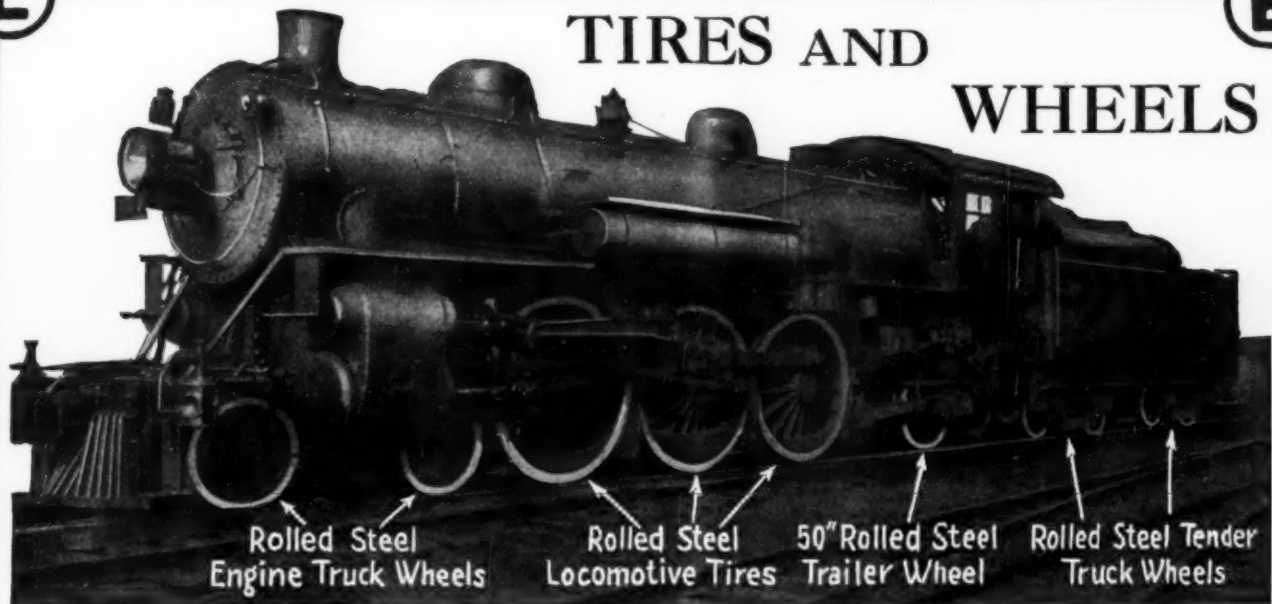
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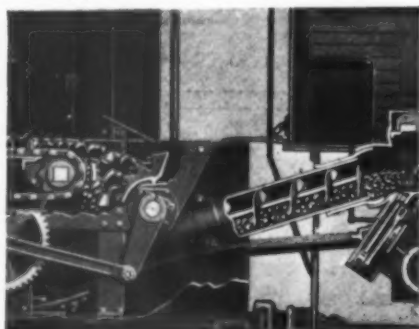
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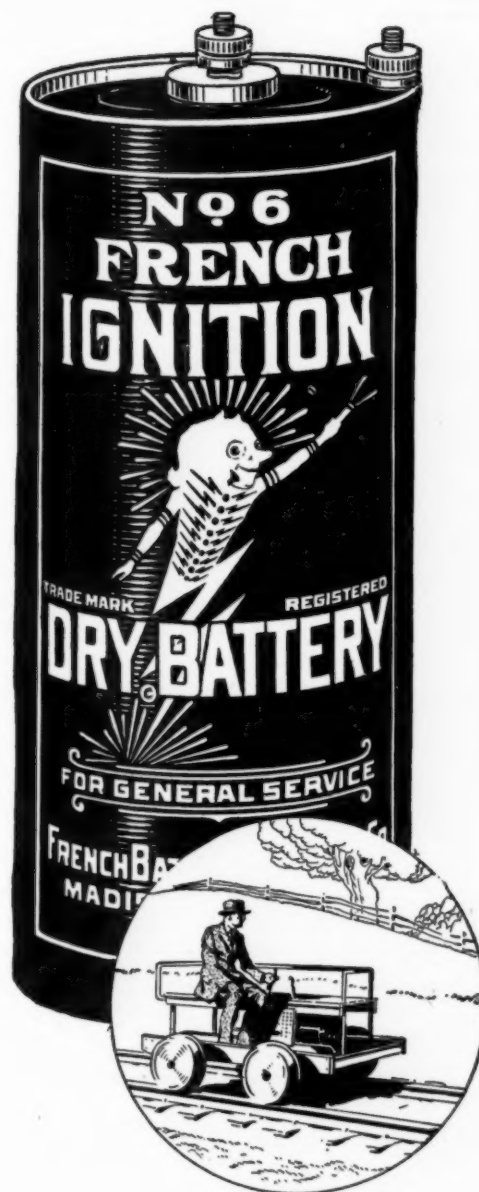
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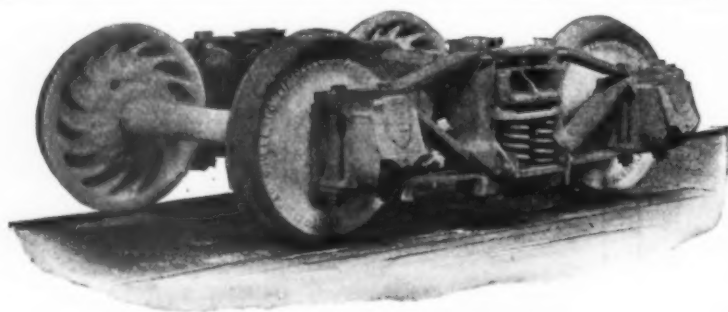
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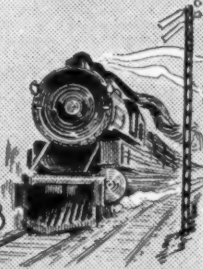
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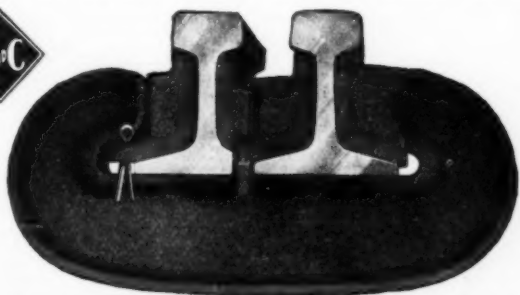
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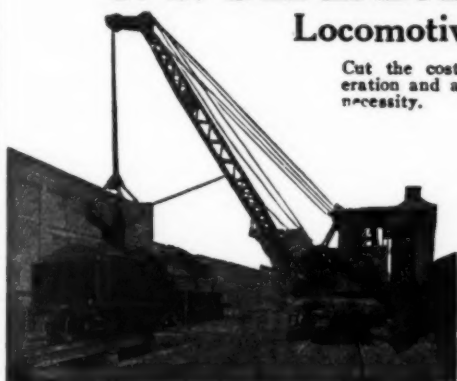
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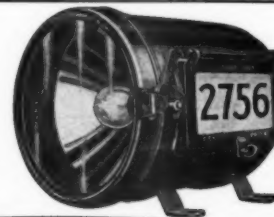
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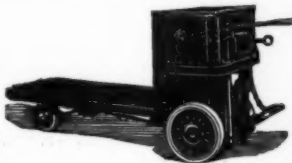
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Adding Machines and Typewriters. Burroughs Adding Machine Co.	Bending and Straightening Machines. Ryerson & Son, Joseph T. Sellers & Co., Inc., Wm.	Brake Beams—Supports. American Steel Foundries. Chicago Railway Equipment Co. Davis Brake Beam Co.	Cableways—(See Tramways).	Cars, Shapes Pressed Steel. Morton Mfg. Co.
Air Lifts. Ingersoll-Rand Co.	Billets, Steel. Carnegie Steel Co. Central Steel Co. Illinois Steel Co. McConway & Torley Co. Midvale Co., The	Brake Forgings, Pins, Levers, Etc. American Steel Foundries. Schaefer Equip. Co. Steel Car Forge Co.	Calculating Machines. Burroughs Adding Machine Co.	Cars, Spreader. Jordan Co., O. F.
Air Reservoir Joints—(See Joints, Air Reservoir).	Billing Machines. Burroughs Adding Machine Co.	Brake Heads. American Steel Foundries. Chicago Railway Equip. Co. National Malleable and Steel Castings Co.	Car Ends, Steel. Chicago Cleveland Car Roofing Co.	Cars, Tank. Bethlehem Steel Co. Pressed Steel Car Co. Warren Steel Car Co.
Alloy Steel. Central Steel Co.	Blocks, Creosoted. International Creosoting & Constr. Co. Jennison Wright Co. Long-Bell Lumber Co., The	Brake Jaws. National Malleable and Steel Castings Co. National Railway Appliance Co. Schaefer Equipment Co. Steel Car Forge Co.	Car Lighting Equipment—(See Lighting Car Equipment).	Castings, Brass and Bronze. Magnus Co.
Angle Bars—(See Joints, Rail).	Blooms, Steel. Carnegie Steel Co. Central Steel Co.	Brake Shoes. American Brake Shoe & Fdy. Co. Buckeye Steel Castings Co. Fort Pitt Malleable Iron Co. Railway Materials Co. Standard Brake Shoe & Foundry Co.	Car Material, Wood. Exchange Sawmills Sales Co. Louisiana Red Cypress Co.	Castings, Grey Iron. American Brake Shoe & Fdy. Co. American Locomotive Co. Baldwin Locomotive Works. Magnus Co., Inc. National Malleable and Steel Castings Co. Ramapo Ajax Corp. Standard Brake Shoe & Foundry Co.
Angles, Channels and Tees—(See Shapes, Structural).	Blower Fittings, Automatic Smokebox. Barco Mfg. Co.	Brakes, Air. General Electric Co. Westinghouse Air Brake Co.	Car Parts and Appliances. Pullman Co., The.	Castings, Gun Iron. Hunt-Spiller Mfg. Corp. Ramapo Iron Works.
Arch, Locomotive Brick. American Arch Co.	Blow Off Line Joints, Round-house—(See Joints, Etc.).	Brakes, Clasp. American Steel Foundries.	Car Parts, Second-Hand. Briggs & Turivas.	Castings, Malleable Iron. American Malleable Castings Assn. Buckeye Steel Castings Co. Chicago Railway Equipment Co. Fort Pitt Malleable Iron Co. National Malleable and Steel Castings Co. P. & M. Co., The
Arresters, Lighting. Electric Service Supplies Co.	Boilers, Locomotive. American Locomotive Co. Baldwin Locomotive Works.	Brakes, Electric. Westinghouse Air Brake Co.	Car Steps, Safety. Morton Mfg. Co.	Castings, Monel Metal and Nickel. Inter. Nickel Co.
General Electric Co. P. & M. Co., The	Boilers, Scale Proof. Industrial Works.	Brakes, Hand. Miner, W. H. National Malleable and Steel Castings Co. Union Railway Equipment Co. Wine Ry. Appliance Co.	Car Wheel Borers. Manning, Maxwell & Moore, Inc.	Castings, Steel. American Locomotive Co. American Steel Foundries. Bethlehem Steel Co. Buckeye Steel Castings Co. Commonwealth Steel Co. Edgewater Steel Co. McConway & Torley Co. Standard Brake Shoe & Foundry Co. Standard Steel Works. Union Spring & Mfg. Co. Union Steel Casting Co.
Ash Conveyors. Industrial Works. McMyler Interstate Co.	Boilers, Water Tube. Babcock & Wilcox.	Brick Locomotive Arch. American Arch Co.	Cars, Ballast. Bethlehem Steel Co.	Cement, Car Roofing. Lucas Co., Robt. M.
Automatic Train Control. Miller Train Control Corp.	Bolsters, Steel. American Steel Foundries. Bradford Corp. Buckeye Steel Castings Co. Commonwealth Steel Co. Pressed Steel Car Co.	Bridge Builders. Bethlehem Steel Co.	Cars, Dump. Bethlehem Steel Co. Clark Car Co. McMyler Interstate Co.	Center Plates—(See Bearings, Center).
Axles, Car and Locomotive. American Locomotive Co. Baldwin Locomotive Works. Bethlehem Steel Co. Carnegie Steel Co. Illinois Steel Co. Johnson & Co., J. R. Lima Locomotive Works. Midvale Co., The Standard Steel Works.	Bolts and Nuts. American Bolt Corp., The (Rosa Nut Division). Bethlehem Steel Co. Foster Co., L. B. National Malleable and Steel Castings Co. Ryerson & Son, Joseph T.	Bridge Stringers—(See Stringers, Bridge).	Cars, Freight. Bethlehem Steel Co. Greenville Steel Car Co. Newport News Shipbuilding & Dry Dock Co. Pressed Steel Car Co. Pullman Co., The Ralston Steel Car Co. Warren Steel Car Co.	Chemicals. Dearborn Chemical Co. Chemists. Dearborn Chemical Co. Hunt & Co., Robt. W. Chimneys, Cast Iron. Dickinson, Inc., Paul. Cinder Handling Plants. Roberts & Schaefer Co.
Axles, Mine Car. Brill Co., J. G., The.	Bolts, Patch. Falls Hollow Staybolt Co.	Bridge Stringers—(See Stringers, Bridge).	Cars, Gasoline, Motor. Brill Co., J. G., The. Sykes Co., The.	Circuit Breakers. General Electric Co.
Bars, Concrete Reinforcing. American Steel & Wire Co. Carnegie Steel Co. Illinois Steel Co.	Bolts, Track. Bethlehem Steel Co. Illinois Steel Co.	Buckets, Clam Shell. Brown Holsting Machy. Co. Browning Co. Industrial Works. McMyler Interstate Co. Orton & Steinbrenner Co.	Cars, Hand and Push. Fairmont Railway Motors, Inc. Mudge & Co.	Clamps, Flanging. Ryerson & Son, Joseph T.
Bars, Iron and Steel. Bethlehem Steel Co. Carnegie Steel Co. Central Steel Co. Falls Hollow Staybolt Co. Illinois Steel Co. McConway & Torley Co. Ryerson & Son, Joseph T.	Bolts, Track. Bethlehem Steel Co. Illinois Steel Co.	Buffers, Friction. Miner, W. H. Standard Coupler Co. Westinghouse Air Brake Co.	Cars, Industrial. Bethlehem Steel Co. Brill Co., J. G., The. Foster Co., L. B. Pressed Steel Car Co.	Clamps, Guard Rail. Q. & C. Co., The
Batteries, Dry. French Battery and Carbon Co.	Bonding, Rail Outfits. Ingersoll-Rand Co.	Buildings, Iron Steel and Steel Concrete. McClellan & Junkersfeld, Inc. White Eng. Corp., J. G.	Cars, Motor (Inspection). Fairmont Railway Motors, Inc.	Clamps, Hose. National Malleable and Steel Castings Co. Westinghouse Air Brake Co.
Batteries, Electric Storage. Electric Storage Battery Co. Safety Car Heating & Lighting Co.	Book-Keeping Machines. Burroughs Adding Machine Co.	Bulldozers. Ryerson & Son, Joseph T.	Cars, Motor (Section). Clark Car Co. Fairmont Railway Motors, Inc. Mudge & Co.	Clamps, Pipe. Franklin Ry. Supply Co., Inc. National Malleable and Steel Castings Co.
Batteries, Wet Cell. Electric Storage Battery Co.	Books, Railway. Gibson-Fribble Co. Simmons-Boardman Publishing Co.	Cable Accessories, Electrical. Electric Service Supplies Co.	Cars, Ore. Brill Co., J. G., The Clark Car Co.	
Bearing, Metal. Stewart Mfg. Co.	Boosters, Locomotive. Franklin Ry. Supply Co., Inc.		Cars, Passenger. Brill Co., J. G., The. Pressed Steel Car Co. Pullman Co., The Ralston Steel Car Co.	
Bearings, Axles, Motor and Push Car. Fairmont Railway Motors, Inc.	Booths, Telephone. Dickinson, Inc., Paul.		Cars, Rail Gasoline. Worcester, Blaine J.	
Bearings, Center. Chicago Ry. Equipment Co. Miner, W. H. Symington Co., T. H. Woods & Co., Edwin S.	Boring and Turning Mills. Vertical. Manning, Maxwell & Moore, Inc.		Cars, Rebuilt and Repaired. Greenville Steel Car Co. Ralston Steel Car Co. Warren Steel Car Co.	
Bearings, Journal. Magnus Co.	Braces, Rail. Bethlehem Steel Co. Fort Pitt Malleable Iron Co. National Malleable and Steel Castings Co. Q. & C. Co., The Ramapo Ajax Corp.			
Bearings, Roller Side. Q. & C. Co., The Standard Coupler Co.				
Bearings, Side. American Steel Foundries. Chicago Railway Equipment Co. Fort Pitt Malleable Iron Co.				

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BUYERS INDEX

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Closets, Water. Duner Co.	Cranes, Portable. Brown Hoisting Mch. Co. Elwell Parker Electric Co. Industrial Works. McMyler Interstate Co. Orton & Steinbrenner Co.	Cranes, Tractor. Industrial Works. McMyler Interstate Co.	Engineers, Sand Dryer's Ma- chine Constr. Hetherington & Berner, Inc.	Forgings, Drop. Steel Car Forge Co.
Coach and Coach Yard Steam Joints—(See Joints, Etc.).	Cranes, Wharf. Industrial Works.	Cranes, Wrecking. Brown Hoisting Mch. Co. Industrial Works. McMyler Interstate Co. Orton & Steinbrenner Co.	Engines, Crude and Fuel Oil. Worthington Pump & Mch. Corp.	Foundations. Smith & Co., C. E.
Coal, Ore and Ash Handling Machines. Brown Hoisting Machinery Co. Industrial Works. McMyler Interstate Co. Orton & Steinbrenner Co. Roberts & Schaefer Co.	Cooling Stations. Roberts & Schaefer Co.	Cocks, Angle. Westinghouse Air Brake Co.	Engines, Gas and Gasoline. Ingersoll-Rand Co. Worthington Pump & Mch. Corp.	Frames, Locomotive. American Locomotive Co. American Steel Foundries. Baldwin Locomotive Works. Union Steel Casting Co.
Combination Crane Pile Driver. Industrial Works.	Compounds, Boiler. Bird-Archer Co., The Dearborn Chemical Co.	Compressors, Air. General Electric Co. Ingersoll-Rand Co. Worthington Pump & Mch. Corp.	Engines, Hoisting. Brown Hoisting Mch. Co. Industrial Works. McMyler Interstate Co. Orton & Steinbrenner Co.	Frames, Safety Motor Car. Fairmont Railway Motors, Inc.
Conduits, Metallic Flexible. Barco Mfg. Co. Franklin Railway Supply Co., Inc.	Crossings — (See Frogs and Crossings).	Crossheads and Shoes. Baldwin Locomotive Works. Barco Mfg. Co.	Expanders, Tube. Ryerson & Son, Joseph T.	Frames, Truck. American Locomotive Co. American Steel Foundries. Baldwin Locomotive Works. Buckeye Steel Castings Co. Franklin Railway Supply Co., Inc.
Connections, Trunk Lever. National Malleable and Steel Castings Co. Schaefer Equipment Co.	Crushers, Coal. Brown Hoisting Mch. Co. Orton & Steinbrenner Co. Worthington Pump & Mch. Corp.	Culverts. American Rolling Mill Co., The American Sheet & Tin Plate Co.	Fans, Exhaust and Ventilat- ing. General Electric Co. Mudge & Co.	Frames, Vanadium. American Locomotive Co. Baldwin Locomotive Works. Union Steel Casting Co.
Connectors, Automatic T. P.— (See Train Pipe Connect- ors, Automatic).	Curtains and Fixtures, Car Vestibule. Morton Mfg. Co.	Curtains and Fixtures, Car Window. Morton Mfg. Co.	Fasteners, Car Door. Camel Co. Fort Pitt Malleable Iron Co. Miner, W. H. National Malleable and Steel Castings Co.	Frogs and Crossings. Bethlehem Steel Co. Poster Co., L. B. Ramapo Ajax Corp.
Connectors, Electrical. Electric Service Supplies Co.	Cutlery, Flue. Ryerson & Son, Joseph T.	Cyclopedias, Railway. Simmons-Boardman Publish- ing Co.	Ferro Molybdenum. Vanadium Corp. of America.	Fulcrums, Brake Beam. American Steel Foundries. Chicago Ry. Equipment Co. National Malleable and Steel Castings Co.
Control Devices, Train Speed. Miller Train Control Corp.	Derails. Q. & C. Co., The	Derails. Q. & C. Co., The	Ferro Tungsten. Vanadium Corp. of America.	Furnaces, Electric. General Electric Co.
Controllers, Electrical. General Electric Co.	Devices, Safety, Motor Car. Fairmont Railway Motors, Inc. Mudge & Co.	Diaphragms for Cars, Canvas and Steel. Morton Mfg. Co.	Ferro Vanadium. Vanadium Corp. of America.	Furnaces, Rivet Heating—(See Forges, Rivet Heating).
Conveyor, Ash—(See Coal, Ore and Ash Handling Mach.).	Diaphragms, Bumping Mecha- nism. Morton Mfg. Co.	Disinfectants. West Disinfecting Co.	Fencing, Wire — (See Wire Fence).	Gage Testers — (See Testers, Gage).
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Couplers. American Steel Foundries. Buckeye Steel Castings Co. Franklin Railway Supply Co., Inc. McConway & Torley Co. National Malleable and Steel Castings Co. Standard Coupler Co. Westinghouse Air Brake Co.	Door, Locomotive, Fire-Box. Franklin Railway Supply Co., Inc.	Doors, Car. Camel Co. Miner, W. H. Wine Ry. Appliance Co.	Filters, Water. Giessel Co., Henry.	Gages, Wheel Press Record- ing. Ashton Valve Co.
Coupler Pockets—(See Draft Yokes).	Doors, Grain. Exchange Sawmills Sales Co.	Doors, Steel. Morton Mfg. Co.	Filtration Plants, Water. American Water Softener Co. Nelson & Sons, Jos. E.	Gates, Tail. Morton Mfg. Co.
Couplings, Hose. Fort Pitt Malleable Iron Co. Gold Car Htg. & Ltg. Co. Ingersoll-Rand Co. Westinghouse Air Brake Co.	Draft Arms. American Steel Foundries. Bradford Corp.	Draft Yokes. American Steel Foundries. Buckeye Steel Castings Co. Keyoke Railway Equip. Co. Miner, W. H. Standard Coupler Co. Symington Co., T. H. Union Draft Gear Co. Walker Draft Gear Corp. Westinghouse Air Brake Co.	Fireboxes. American Locomotive Co. Baldwin Locomotive Works.	Gear Blanks, Rolled Steel. Carnegie Steel Co. Standard Steel Works.
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Cranes, Barge. Industrial Works.	Drills, Track and Bonding. Ingersoll-Rand Co.	Driving Boxes (Extended Main). Franklin Railway Supply Co.	Fixtures, Car Door. Camel Co. Miner, W. H. National Malleable and Steel Castings Co. Union Railway Equipment Co.	Gears, Silent. General Electric Co.
Cranes, Electric Traveling. Brown Hoisting Mch. Co. Industrial Works. Manning, Maxwell & Moore, Inc. McMyler Interstate Co. Morgan Engineering Co. Sellers & Co., Inc., Wm.	Draw Bars, Unit Safety. Franklin Railway Supply Co., Inc.	Dredging Machinery. Industrial Works.	Flangers, Snow. Q. & C. Co., The	Gears, Valve — (See Valve Gears).
Cranes, Gantry. Brown Hoisting Mch. Co. Industrial Works. Morgan Engineering Co. Orton & Steinbrenner Co.	Drawbar Centering Device. Miner, W. H. Union Railway Equipment Co.	Drilling Machines, Pneumatic. Ingersoll-Rand Co.	Flashlights. French Battery and Carbon Co.	Generators, Car Lighting. Safety Car Lighting & Heating Co.
Cranes, Jib. Brown Hoisting Mch. Co. Industrial Works. McMyler Interstate Co. Morgan Engineering Co.	Draw Bars, Unit Safety. Franklin Railway Supply Co., Inc.	Drilling Machines, Rock. General Electric Co. Oldham & Son Co., Geo.	Floodlights. Electric Service Supplies Co.	Generators, Electric. Electric Service Supplies Co. General Electric Co.
Cranes, Locomotive. Browning Co. Brown Hoisting Mch. Co. Industrial Works.	Draw Bars, Unit Safety. Franklin Railway Supply Co., Inc.	Drilling Machines, Upright and Radial. Manning, Maxwell & Moore, Inc. Ryerson & Son, Joseph T.	Flooring. Jennison Wright Co. Long-Bell Lumber Co., The	Glass, Wire. Mississippi Wire Glass Co.

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Orton & Steinbrenner Co.</p> <p>Holists, Air. Ingersoll-Rand Co.</p> <p>Holists, Chain. Ryerson & Son, Joseph T.</p> <p>Holists, Electric. Brown Hoisting Mch. Co. Manning, Maxwell & Moore, Inc.</p> <p>Holists, Pneumatic. Ingersoll-Rand Co.</p> <p>Holders, Angle Cock. Mudge & Co.</p> <p>Hooks, Wrecking. National Malleable and Steel Castings Co.</p> <p>Hoppers, Wet and Dry (Car). Duner Co.</p> <p>Hose, Air, Steam, Etc. Oldham & Son Co., Geo. Westinghouse Air Brake Co.</p> <p>Indicators. Distance Speed Recording Co.</p> <p>Ingots. Carnegie Steel Co. Edgewater Steel Co. Illinois Steel Co. McConway & Torley Co. National Malleable and Steel Castings Co.</p> <p>Inspection of Material and Equipment—(See Engineers, Inspection).</p> <p>Insulation, Car. Lehon Co., The. Nelson Mfg. Co., B. F. Union Asbestos & Rubber Co.</p> <p>Insulation, Electrical. Electric Service Supplies Co. General Electric Co.</p> <p>Insulation, Heat. Nelson Mfg. Co., B. F.</p> <p>Iron Chain. 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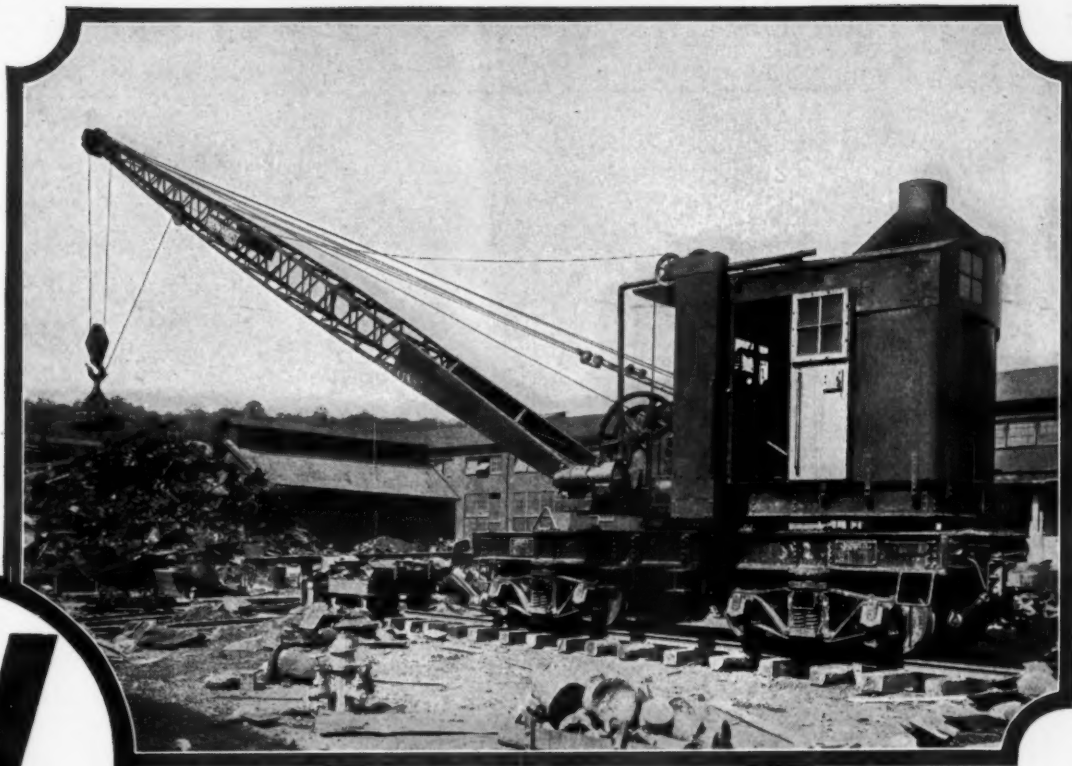
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Co. Mudge & Co. Vapor Car Heating Co., Inc. Wine Railway Appliance Co. Ventilators, Shop and Roundhouse. Dickinson, Inc., Paul. Washers. National Malleable and Steel Castings Co. Wine Railway Appliance Co. Washing Systems, Boiler. National Boiler Washing Co. of Ill. Water Columns—(See Columns, Water). Water Coolers. Glessel Co., Henry. Waterproofing Materials. Lehon Co., The. Nelson Mfg. Co., B. F. Water Purifying Materials and Compounds. Bird-Archer Co., The. Dearborn Chemical Co.	Water Softening and Purifying. American Water Softener Co. Bird-Archer Co., The. Dearborn Chemical Co. Nelson & Sons, Jos. E. Weather Stripping. Tuco Products Corp. Wedges, Automatic. Franklin Ry. Supply Co., Inc. Wedges, Journal Box. American Steel Foundries. National Malleable and Steel Castings Co. Steel Car Forge Co. Welding Machines, Electric. General Electric Co. Welding Machines, Flue. Ryerson & Son, Joseph T. Welding and Cutting Apparatus—(See Cutting and Welding Apparatus). Welding Rods and Wire. 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The crane in the illustration is one of the No. 4 Brownhoists owned by the Westinghouse Electric & Mfg. Co. This crane is in use at the Trafford, Pa. plant.

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There are definite reasons why such companies as Westinghouse have chosen Brownhoist cranes. The high rate that these machines return on the capital invested, their wide range of adaptability to all types of handling service and their ability to stand up on the hardest kind of work, are but a few of the influencing factors.

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R. P. M.	Cutoff	Heater Stoker	Injector Stoker	Heater Stoker	Injector Stoker	
40	20	1948	2336	2.45	2.91	15.5
40	30	2648	3090	2.38	2.81	15.3
40	40	3208	4086	2.47	3.04	18.8
80	20	2593	2951	2.07	2.42	14.5
80	30	3913	4480	2.12	2.53	16.5
80	40	4767	5757	2.09	2.54	17.7
80	50	6571	7626	2.35	2.77	15.2



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